D. A. Young

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THE

RUDIMENTS

OF

ARCHITECTURE :

BEING A

TREATISE ON PRACTICAL GEOMETRY,

ON

GRECIAN AND ROMAN MOULDINGS;

SHEWING

THE BEST METHOD OF DRAWING THEIR CURVES, WITH REMARKS ON THE EFFECT OF BOTH.

ALSO, ON

THE ORIGIN OF BUILDING,

ON

THE FIVE ORDERS OF ARCHITECTURE,

ON

THEIR GENERAL AND PARTICULAR PARTS AND EMBELLISHMENTS;

WITH EXAMPLES FOR

CORNICES, BASE AND SURBASE MOULDINGS,

ARCHITRAVES, AND STAIRS.

CORRECTLY ENGRAVED ON THIRTY-FOUR COPPERPLATES.

BY ASHER BENJAMIN.

SECOND EDITION,

ENLARGED, WITH A PLAN AND ELEVATIONS OF A CHURCH.

BOSTON:

PUBLISHED BY R. P. & C. WILLIAMS,

CORNHILL-SQUARE,

(Between Nos. 58 and 59, Cornhill, opposite the Old State-House.)

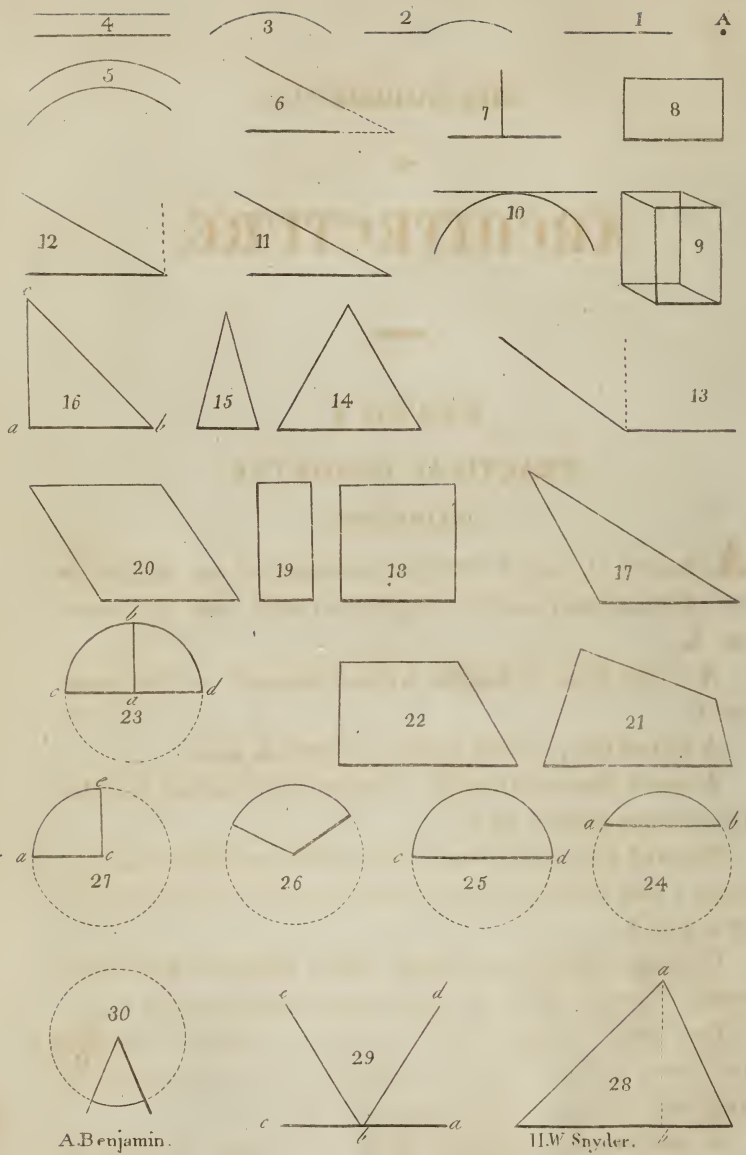
1820.

Printed by Munroe & Francis,
No. 4, Cornhill.

PREFACE

TO THE FIRST EDITION, 1814.

As custom has established the necessity of a preface, it gives me an opportunity of saying, that the want of a treatise on architecture, fully explaining the rudiments of the art, the price of which being so small, as to put it within the reach of every apprentice, will, in my opinion, be a sufficient apology for the appearance of this book. I have endeavoured to methodise and explain this work, in such a plain, and easy manner, that the young student may collect from it a general knowledge of architecture. It will be necessary for the student, to commence his studies at the beginning of the work, and fully understand *every* example as he progresses, as there is nothing which will be useless to him. He will be greatly assisted, by reading the origin of building, and the parts which compose the five orders, their application and embellishments; also the orders themselves, which I have collected from some of the most celebrated books on this subject.



A.Benjamin.

H.W Snyder.

THE RUDIMENTS

OF

ARCHITECTURE.

PLATE I.

PRACTICAL GEOMETRY.

DEFINITIONS.

A POINT is that which has position, but no magnitude nor dimensions; neither length, breadth, nor thickness, as A.

A right line, is length without breadth or thickness, as 1.

A mixed line, is both right and curved, as 2.

A curve line continually changes its direction between its extreme points, as 3.

Parallel lines are always at the same perpendicular distance; and they never meet, though ever so far produced, as 4 and 5.

Oblique right lines change their distance, and would meet, if produced, on the side of the least distance, as 6.

One line is perpendicular to another, when it inclines not more on the one side than the other; or when the angles on both sides of it are equal, as 7.

A surface, or superfices, is an extension, or a figure, but without thickness, as 8.

A body, or solid, is a figure of three dimensions; namely, length, breadth, and thickness, as 9.

A line, or a circle, is tangential, or a tangent to a circle, or other curve, when it touches it without cutting, when both are produced, as 10.

An angle, is the inclination, or opening of two lines, having different directions, and meeting in a point, as 11.

A right angle, is that which is made by one line perpendicular to another, or when the angles on each side are equal to one another, as the lines, *a b*, and *a c*, on 16.

An acute angle, is less than a right angle, as 12.

An obtuse angle, is greater than a right angle, as 13.

Plain figures that are bounded by right lines, have names according to the number of their sides, or of their angles; for they have as many sides as angles; the least number being three. A figure of three sides and angles, is called a triangle, as 14, 15, 16 and 17; and they receive particular denominations from the relations of their sides and angles.

An equilateral triangle, is that whose three sides are all equal, as 14.

A right angled triangle, is that which has one right angle, as 16.

An isosceles triangle has only two sides equal, as 15.

A scalene triangle has all sides unequal, as 17.

An obtuse angled triangle has one obtuse angle, as 17.

Of four sided figures there are many sorts; as the square 18, which is a plain regular figure, whose superfices are limited by four equal sides, all at right angles with one another.

The parallelogram 19, receives its name from its opposite sides and ends being parallel to each other; the parallelogram is also called a long square or oblong, in consequence of its being longer than it is wide.

The rhomboids 20, is an equilateral parallelogram, whose angles are oblique, as 20.

A trapezium is a quadrilateral, which has neither pair of its sides parallel, as 21.

A trapezoid hath only one pair of its opposite sides parallel, as 22.

Plane figures having more than four sides, are in general called polygons, and receive other particular names according to the number of their sides or angles.

A pentigon, is a polygon of five sides, as fig. 13, plate 2.

A hexigon, is a polygon of six sides, as fig. 14, plate 2.

A heptagon has seven sides; an octagon eight; a nonagon nine; a decagon ten; an undecagon eleven; and a dodecagon twelve.

A regular polygon has all its sides and its angles equal; and if they are not equal, the polygon is irregular.

An equilateral triangle is also a regular figure of three sides, and a square is one of four; the former being called a trigon, and the latter a tetragon.

A circle is a plain figure, bounded by a curve line, called the circumference, which is every where equidistant from a certain point within, called its centre.

The radius of a circle, is a right line drawn from the centre to the circumference, as *a b*, 23.

A diameter of a circle, is a right line drawn through the centre, terminating on both sides of the circumference, as *c d*, on 23.

An arch of a circle is any part of the circumference, as *a b*, 24.

A chord is a right line joining the extremities of an arch, as *a b*, 24.

A semicircle is half the circle, or a segment cut off by diameter, as *c d*, 25.

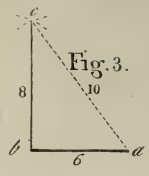
A section is any part of a circle, bounded by an arch and two radii, drawn to its extremities, as 26.

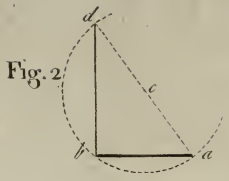
A quadrant, or quarter of a circle, is a sector, having a quarter of the circumference for its arch, and the two radii are perpendicular to each other, as *c a*, and *c e*, 27.

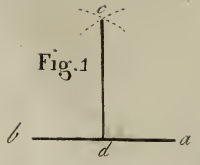
The measure of any right lined angle, is an arch of any circle contained between the two lines, which form the angle, and the angular point being in the centre, as 30.

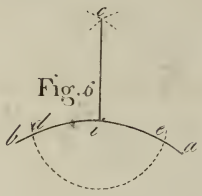
The height, or altitude of any figure, as a perpendicular, let fall from an angle, or its vertex to the opposite side, called the base, as the line, *a b*, 28.

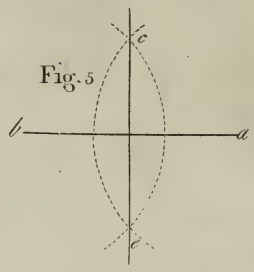
When an angle is denoted by three letters, the middle one is the place of the angle, and the other two denote the sides containing that angle; thus, let *a b d*, be the angle at 29, *b*, is the angular point, *a b*, and *b d*, are the two sides containing that angle.

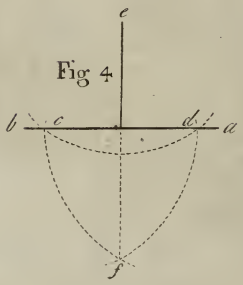


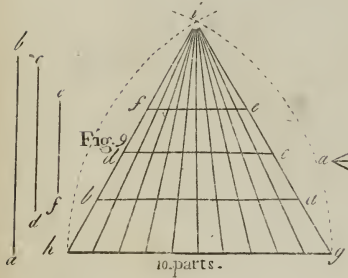


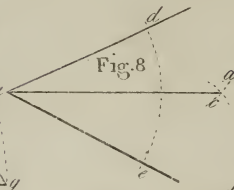


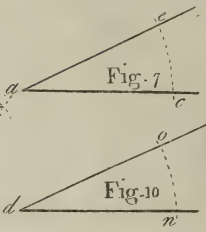


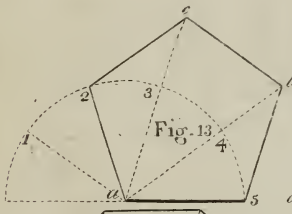


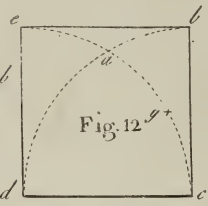


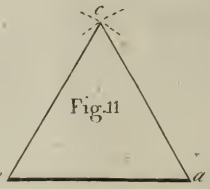


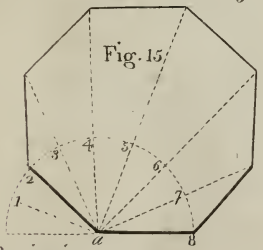












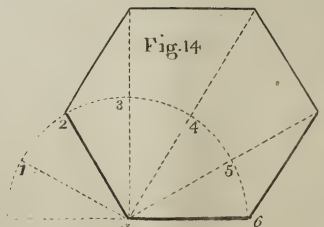


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PLATE II.

FIG. 1.

To draw a perpendicular to a given point in a line. *a b* is a line, and *d* a given point; take *a* and *b*, two equal distances on each side of *d*, and with your compasses in *a* and *b*, make an intersection at *c*, and draw *c d* which is the perpendicular required.

FIG. 2.

To erect a perpendicular on the end of a line. Take any point you please above the line, as *c*, and with the the distance *c b*, make the arch *a b d*, and draw the line *a c*, to cut it at *d*, and draw *d b*, the perpendicular.

FIG. 3.

To make a perpendicular with a ten foot rod. Let *b a* be six feet; take eight feet in your compasses; from *b* make the arch *c*, with the distance ten feet from *a*; make the intersection at *c*, and draw the perpendicular, *c b*.

FIG. 4.

To let fall a perpendicular from a given point in a line. In the point *e*, make an arch to cross the line *a b*, at *c d*; with the distance *c d*, make the intersection *f*, and draw *e f*, the perpendicular.

FIG. 5.

To divide a line in two equal parts by a perpendicular. In the points *a* and *b*, describe two arches to intersect at *c* and *e*, and draw the line *c e*, which makes the perpendicular required.

FIG. 6.

To erect a perpendicular on the segment of a circle, *a b*. From *i*, draw the arch *c d*; and, with the distance,

e d, and on *e* and *d*, make the intersection *c*, and draw the perpendicular, *c i*.

FIG. 7, and 10.

An angle being given, to make another equal to it, from a point, in a right line. Let *a c e*, be the given angle, and *d n*, a right line; *d* the given point; on *a* make an arch *c e*, with any radius, and on *d*, with the same radius, describe an arch, *n o*; take the opening, *c e*, and set it from *n* to *o*, and draw *o d*, and the angle will be equal to that of *a c e*.

FIG. 8.

To divide any given angle into two equal parts. On *a*, the angular point, with the radius, *a c*, or any other, make the circle *e d*; on *e* and *d*, with the radius *e c*, make the intersection *c*, and draw the line *c a*, which is the division required.

FIG. 9.

To divide a right line given, into any number of equal parts. Let *a b*, be a given line, to be divided into ten equal parts; take any distance in your compasses, more than one tenth of the line *a b*, and run them off on the line *h g*, and with that distance, make the triangle *h i g*, and draw each tenth division to the angle *i*; take the length of the given line *a b*, and set one foot of the compasses at *a*, on the line *g i*, and let the other fall on the line *h i*, at *b*, parallel to *h g*, and draw the line *a b*, which gives the ten divisions required; the lines *d c*, and *f e*, or any others which are shorter than the base line of the triangle, can also be drawn across it, which, when done, will be divided into tenths.

FIG. 11.

To make an equilateral triangle upon a right line. Take *a e*, the given side, in your compasses, and on *a* and *e*, make the intersection *c*, and draw *a c*, and *e c*.

FIG. 12.

To make a geometrical square upon a right line. With the given side *d c*, and in the points *d c*, describe two arches to intersect at *a* ; divide *a c*, into two equal parts at *g* ; make *a e*, and *a b*, each equal to *a g*, and draw *c b*, *d e*, and *e b*.

FIG. 13, 14, and 15.

The sides of any polygon being given to describe the polygon to any number of sides whatever. On the extreme of the given side make a semicircle of any radius, it will be most convenient to make it equal to the side of the polygon ; then divide the semicircle into the same number of equal parts as you would have sides in the polygon, and draw the lines from the centre through the several equal divisions in the semicircle, always omitting the two last, and run the given side round each way upon those lines ; join each side, and it will be completed.

FIG. 13.

How to describe a pentagon. Let *a* 5, be the given side, and continue it out to *e* ; on *a* the centre, describe a semicircle ; divide it into five equal parts ; through 2, 3, and 4, draw *a* 2, *a c*, *a* and *b*, make 5 *b*, equal to *a* 5, 2 *c*, and *c b*, each equal to *a* 5, or *a* 2 ; join *a* 2, 2 *c*, *c b*, and *b* 5 ; in the same way may any polygon be drawn, only divide the semicircle into the same number of parts that the polygon is to have sides.

PLATE III.

FIG. 1.

To make an octagon in a square. Find the centre *n*, with the distance, *a n*, and in the points *a b c d*, make the arches *e n m*, *l n h*, *i n f*, and *k n g*; join *l k*, *m i*, *h g*, and *f e*, which completes the octagon.

FIG. 2.

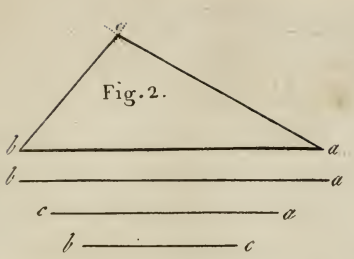
Any three lines being given to make a triangle. Take one of the given sides, *a b*, and make it the base of the triangle; take the second side, *c a*, in your compasses, place one foot in *a*, and make the arch at *c*; take the third side, *b c*, and place one foot of the compasses in *b*, and make the intersection *c*, then draw *c a*, and *c b*, which completes the triangle.

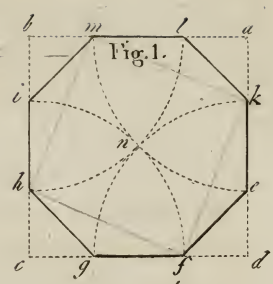
FIG. 3.

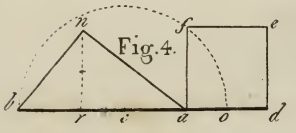
Two right lines being given to find a mean proportion. Join *a c*, and *c b*, in one straight line; divide it into two equal parts at the point *n*, with the radius *n a*, or *n b*; describe a semicircle, and erect the perpendicular *c d*, then is *b c*, to *c d*, as *c d*, is to *c a*.

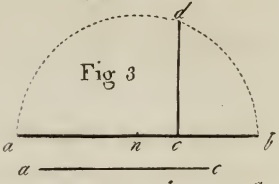
FIG. 4.

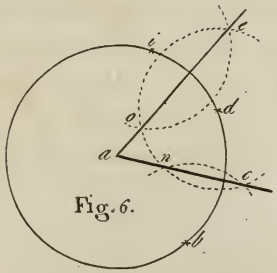
To make a geometrical square, equal to a triangle given. Let *a b n*, be the given triangle; extend *b a*, to *o*; make *a o*, equal to half of *n r*, and with one half of *b o*, on the point *c*, make a semicircle; from *a*, erect a perpendicular intersecting the circle at *f*; make *a d*, *d e*, and *e f*, each equal to *a f*, and the geometrical square is completed.

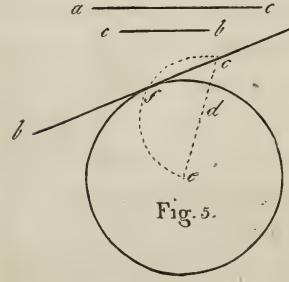


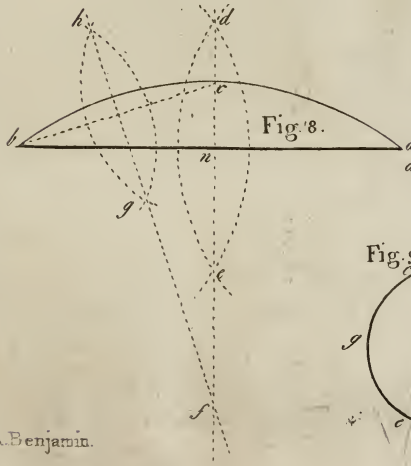


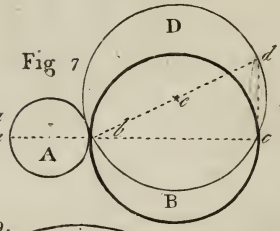












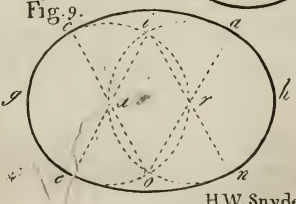


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FIG. 5.

A tangent line being given, to find the point where it touches the circle. From any point in the tangent line *a b*, as *c*, draw a line from the centre *e*; divide *e c*, into two equal parts at *d*; on *d* with the radius *d e*, or *d c*, describe an arch, cutting the given circle at *f*, which is the point required.

FIG. 6.

Through any three points given, to describe the circumference of a circle. Let *i d b*, be the given points; on *i d* and *b*, with any radius large enough to make the intersections *o e*, and *n c*, describe the arches *e o*, and *n c*; draw the lines *e a*, and *c a*, cutting *o*, and *n*, and meeting at *a*, the centre.

FIG. 7.

Two circles being given, to make another circle to contain the same quantity. Let A and B be the two given circles; draw *a c*, cutting the two circles in their centres; on *c* erect a perpendicular; make *c d*, equal to *a b*, the diameter of the circle A; draw the line *d b*; divide *d b* into two equal parts at *e*; on *e*, with the distance *e d*, or *e b*, describe the circle D, which is equal, in size, to the two given circles A and B.

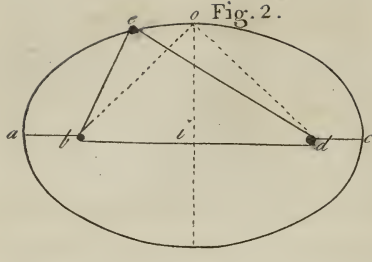
FIG. 8.

To draw a segment of a circle to any length and height. *a b*, is the length, *n c*, the height; divide the length *a b* into two equal parts by a perpendicular *f d*; divide *c b* by the same method, and their meeting at *f* will be the centre for drawing the arch *b c a*, which is the segment required.

FIG. 9.

To describe the representation of an ellipsis by centres. Divide *g h* into three equal parts at *d* and *r*; with that distance, and on *d* and *r*, make the intersections *i* and *o*; from *i*, through *d* and *r*, draw *i n*, and *i e*; from *o*, through *d* and *r*, draw *o c*, and *o a*; on *d* and *r*, describe the circles *c g e*, and *a h n*; on *o* and *i* describe the circles *a c*, and *n e*.

Fig. 2.



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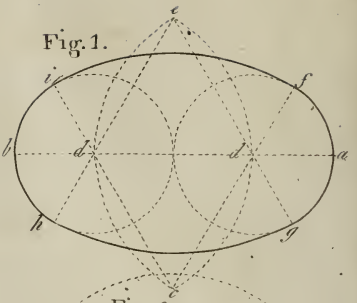

Fig. 4.

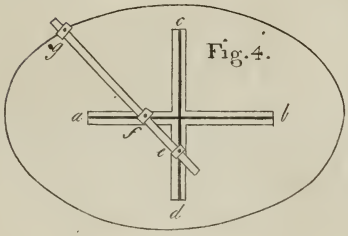

Fig. 3.

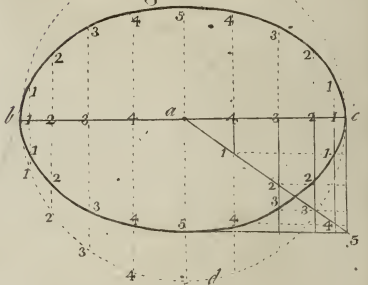

Fig. 6.

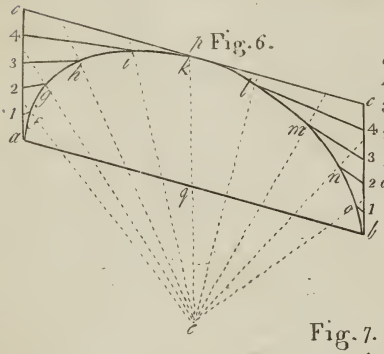

Fig. 5.

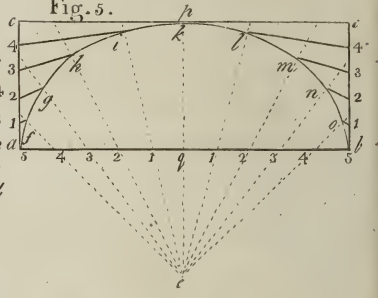

Fig. 7.

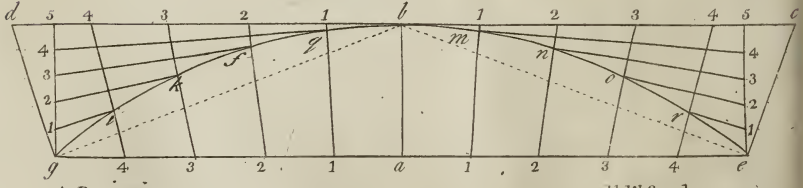

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PLATE IV.

FIG. 1.

To describe a representation of an ellipsis by centres. Divide *a b*, into four equal parts; with the distance *d d*, and on *d d*, describe the arches *e d c*, and *e d c*; draw *e f*, *c i*, *e g*, and *e h* on *c* and *e*, with the distance *c f*, or *c i*; describe the arches *i f*, and *g h*, on *d*, and *d*; with the distance *d a*, or *d b*, describe the arches *f a g*, and *i b h*.

FIG. 2.

To make an ellipsis with a cord. Take half of the longer diameter *a c*, which is *a i*, or *c i*; with that distance, fix one foot of the compasses in *o*; intersect *a c* at *b* and *d*; tack in a nail at *b* and *d*, then lay a cord round *d* and *b*, and make it meet at *o*; fix a pencil at *o*, and move your hand around, keeping the cord tight, will describe an ellipsis.

FIG. 3.

To describe an ellipsis by ordinates. Make a circle with the radius *a c*, or *a b*; divide the half circle into any number of parts, say 10; make *c* 5, perpendicular to *c b*, and equal to one half of the smaller diameter of the ellipsis; draw ordinates through each of the ten divisions on the semicircle *c d b*; draw *a* 5, then *c a* 5 will be the scale to set off your oval; take 4, 1, from the scale, and set it from 1 to 1, in your oval both ways, and at each end; then take 3, 2, from the scale, and set it from 2 to 2 each way on the oval; find all the other points in the same manner; a curve being traced through each of these points, will form the true ellipsis.

FIG. 4.

To describe an ellipsis by a trammel. *g f e*, is a trammel rod; *g*, a nut, with a hole through it, to hold a pencil; at *f* and *e*, are two other sliding nuts; make the distance of *f*, from *g*, one half of the shorter diameter of the ellipsis, and from *g* to *e*, equal to one half of the longer diameter; the points *f* and *e*, being put into grooves *d c*, and *a b*, then moving your pencil around at *g*, will describe a true curve of the ellipsis.

FIG. 5, and 6.

To draw a semi-ellipsis by the intersection of lines. Let the given axis be *a b*, and divide it into any number of parts, as 10; also let the height be divided into half that number of parts, as 5; make *e q*, equal to *q k*, the height of the arch; then from the point *e*, draw lines through the equal divisions of the axis *a b*; likewise through the points 1, 2, 3, 4, *c*, in the height *b c*, draw lines tending to the crown at *p*, which will intersect at the points, *o n m l*, and lines being drawn through the divisions of *a c*, at *p*, at the crown; in the same manner will form the points *i h g f*; a curve being traced through these points, will show the true curve of the ellipsis.

FIG. 7.

How to draw tne segment of a circle by intersecting lines. Let *g e*, be the length of the segment; *a b*, its height; draw the chord *b e*, and *b g*; draw *e c*, and *g d*, at right angles with *b e*, and *b g*, and from the centre at *a*, divide *a e*, and *a g*, each into five equal parts; also from *b*, at the crown, in the centre of the line *d c*, divide *b c*, and *b d*, each into five equal parts; and draw 1 1, 2

2, 3 3, 4 4, *e c*, and *g d*, through the divisions 1, 2, 3, 4, 5, on *e* 5, and *g* 5, draw lines to the crown at *b*, which will intersect the other lines at the points *m n o r*, and *q f k i*; the curve being traced, the segment will be complete.

PLATE V.

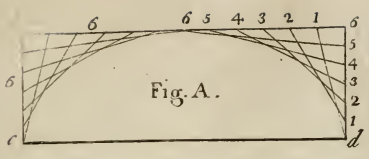
FIG. A.

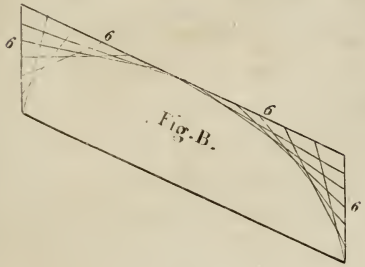
To describe a representation of a semi-ellipsis by the intersection of right lines. Let *c d*, be the transverse diameter, *d* 6, equal to one half of the conjugate diameter; divide *d* 6 and 6 6, each into six equal parts, and draw the lines *d* 1, 1 2, 2 3, 3 4, 4 5, and 5 6, which completes one half; proceed in the same manner to draw the other half, and also to draw fig. B and C.

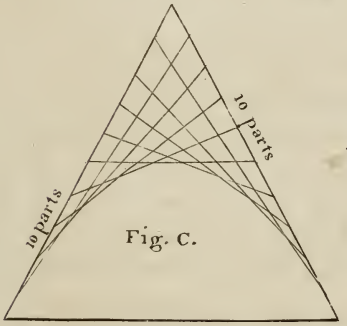
NOTE. This way of representing the ellipsis is not a correct one; but in most cases it will answer in practice, particularly, where exactness is not required. It may be observed that the curve is changed by the number of parts you make use of; if divided into a great number of parts, it makes the curve too quick; if into a small number, it makes it too flat; by taking the medium between these two extremes, you will approximate nigh the truth.

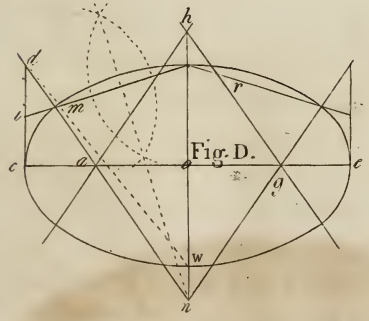
FIG. D.

The transverse and conjugate diameters of an ellipsis being given, to draw its representation. Draw *c d* parallel, and equal to *o r*, bisect it in *i*, draw *i r*, and *d w*, cutting each other at *m*; bisect *m r*, by a perpendicular meeting *r w*, produced at *n*; draw *n d*, cutting *c e*, at *a*; make *o g*, equal to *o a*; *o h*, equal to *o n*, through the points, *a*, *n*, *h*, *g*; draw the lines *n g*, *g h*, *h a*, and *n a*; and in the centres *n*, *h*, *g*, *a*, describe the four sectors, and it will produce the representation required.









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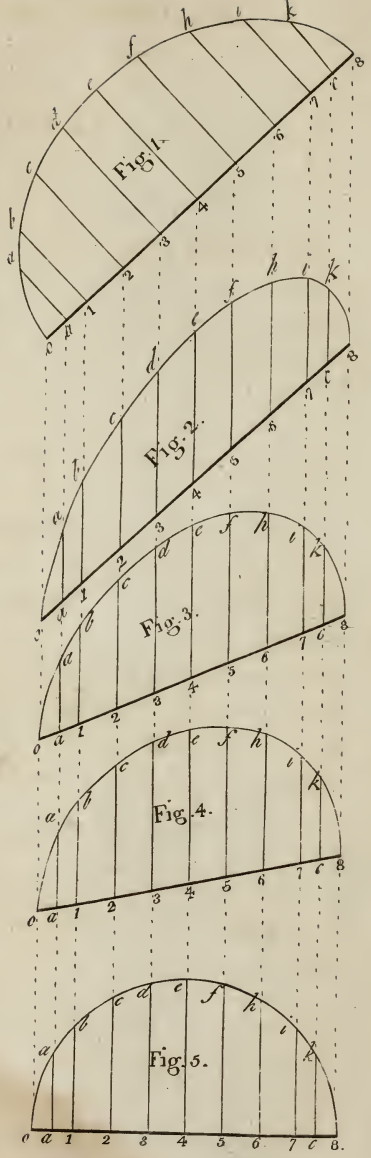

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FIG. 5.

Divide *o* 8 into any number of parts, and draw the ordinates *a a*, 1 *b*, 2 *c*, 3 *d*, 4 *e*, 5 *f*, 6 *h*, 7 *i*, and *c k*; transfer those distances to *a a*, 1 *b*, 2 *c*, 3 *d*, 4 *e*, 5 *f*, &c. to figs. 4, 3, 2, and 1, and through the points, *o*, *a*, *b*, *c*, *d*, *e*, *f*, *h*, *i*, *k*, and 8, trace their curves and the thing is done.

PLATE VI.

FIG. 1.

How to find the curvature of the different ribs in a plaister groins. Let *e n* 1 2 3 4 5 6 7 0 and 8, on A, be the given arch, standing over *e n* 1 2 3 4 &c. to 8, on the plan, or in any other position parallel to it; let *e c*, and *a f*, be the angles of the plan over which the ribs are to be placed; divide the base line *e* 8, of the given rib A, into any number of parts, and through those parts draw lines from the arch to the diagonal line *f c*, which is the base line of the rib D, continue them at right angles through the rib B, and transfer the distances in A, the given rib *n n*, 1 1, 2 2, 3 3, 4 4, 5 5, 6 6, 7 7, 0 0, to *n n*, 1 1, 2 2, 3 3, 4 4, 5 5, 6 6, 7 7, and 0 0, on D and B, and trace the curves, which will complete the angle rib D, and the side rib B.

NOTE. The ribs D and B, may be described with the trmmel, which is laid down on plate 4, fig. 4.

FIG. 2.

To draw a segment of a circle by rods to any length and height. Take two rods, *d h*, and *d a*, each equal to *o n*, the opening; place them to the height at *d*, and at the points *o n*, put a piece across them *o c n*, to keep them tight and move the rods around the points *o n*, and it will describe the segment at the point *d*.

FIG. 3.

How to find the raking mouldings for a pediment. Let A, be the given moulding, B, the raking moulding, and D, the return moulding; draw the line *e a*, in B,

Fig. 1.

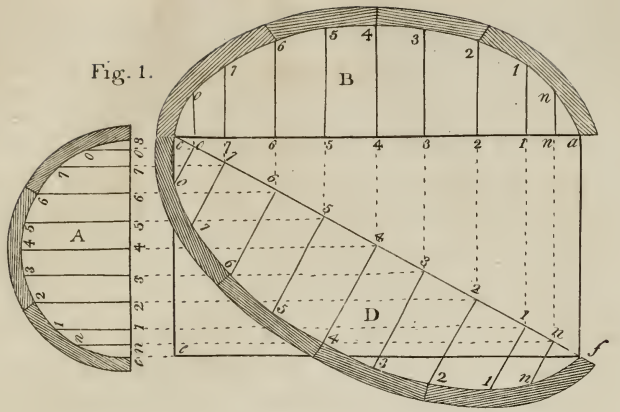


Fig. 2.

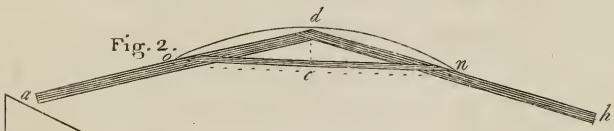
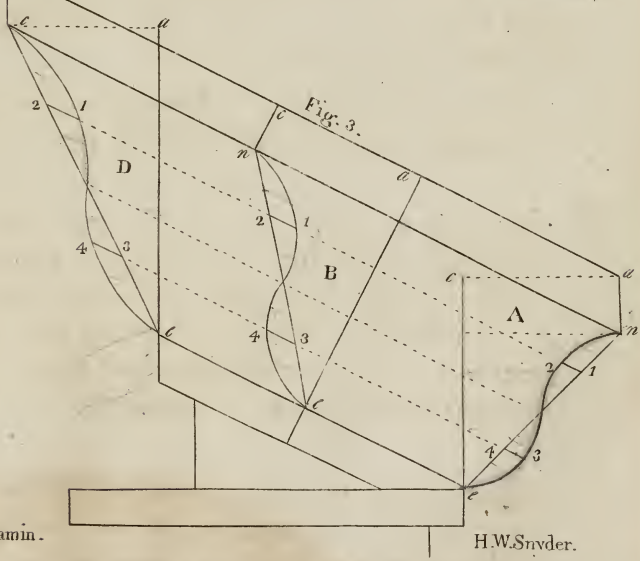


Fig. 3.



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at right angles with the rake of the pediment and *e a*, in D perpendicular, or parallel to *e c*, in A; make *c a* in B, and *c a* in D, each equal to *c a* in A; divide the curve of the given cimarecta A, into any number of parts, as here, into four, and draw lines upon the rake and parallel to it; with the distances 1 2, and 3 4, in A, make the points from 2 to 1, and 3 to 4, in B and D, and through those points trace the curves *e* 4, 1 *n*, in B, and *e* 4, 1 *c*, in D.

PLATE VII.

FIG. 1.

How to diminish the shaft of a column. Let 6 *f*, be the central line; divide it into four parts, and at one fourth make the line *a b*, across the column; on *e*, make the half circle *a e b*; with the distance *f*, 1, at the neck of the column, and on 1, on the central line, make the points 1, 1, on the circle; divide from 1 to *c* into four parts; also, from *c* to *f* into four parts, and draw lines through each of those divisions; and with the distances 2 2, 3 3, and 4 4, in A, on the line 6 *f*, make the points 2 2, 3 3, 4 4, on the sides of the column, and in those points, and in 1 *b*, and 1 *a*, tack in nails or brads, bend a lath around them, and by it mark the curves.

FIG. 2.

How to set out flutes and fillets on a pilaster. Divide *a b* into twenty nine equal parts, and give three of them to each flute, and one to each fillet.

FIG. 3.

How to set out flutes and fillets of a column. Draw the lines *a b*, and *c d*, through the centre of the column, and at right angles with each other; divide the circumference of the column into ninety-six equal parts; with one and one half of those parts in your compasses, and on the lines *a b*, and *c d*, at 3, 3, 3, 3, &c. describe the flutes; the circle *r o s g*, is the size of the column at its neck, where the flutes and fillets are divided, by drawing each line of the fillets across it, pointing to the centre.

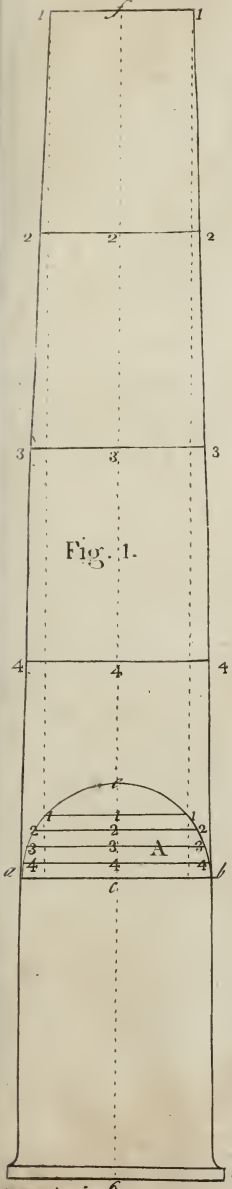

Fig. 1.

Fig. 2.

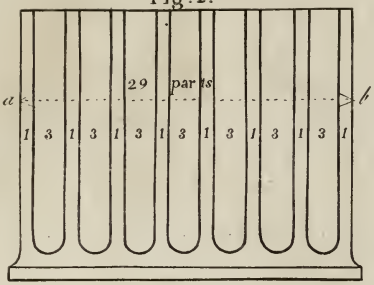

Fig. 3.

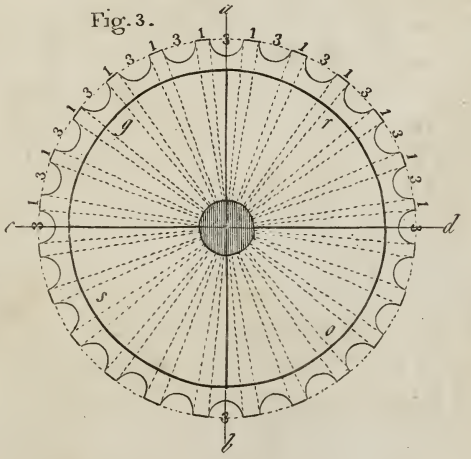

Fig. 4.

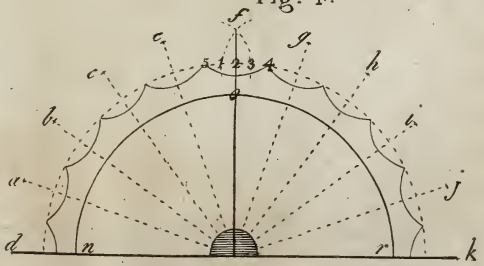

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FIG. 4.

Shows how to set out flutes, without fillets, on the Doric column. Divide the circumference into twenty equal parts ; with three fourths of one of those parts, on the points 5 and 4, make the intersection *f*, and on *f*, describe the flute 5 4 ; *d a b c e g h i j* and *k*, are also centres for drawing the other flutes ; *n o r*, is the size of the column at its neck.

PLATE VIII.

FIG. 1.

To draw the Ionic volute. Draw a geometrical square within the eye of the volute, and bisect its sides in the points 1 3, and 2 4; and from those points, draw the lines 1 3, and 2 4; divide each of them into six equal parts; see A, the eye, at large; place one foot of the compasses at 1, on the side of the geometrical square, and extend the other to *d*, and draw the arch *d e*; then with the distance 2 *e*, and on 2, describe the arch *e f*; on 3, and with the distance 3 *f*, describe the arch *f g*; with the distance 4 *g*, and on 4, describe the arch *g i*; and with the distance 5 *i*, and on 5, describe *i k*; and with the distance 6 *k*; describe *k n*; and with the distance 7 *n*, describe *n o*; and with the distance 8 *o*, describe *o m*; and with the distance 9 *m*, describe *m r*; with 10 *r*, describe *r s*; with 11 *s*, describe *s t*; with 12 *t*, describe *t u*; and on *n*, describe *d a*, which completes the outside line.

To describe the inside line, which diminishes the fillet, divide 1 5 in A, into five equal parts, and set one of them from 1 2 3 4 5 6 7 8 9 10 11 and 12, towards the centre of the eye, which will be the twelve centres for drawing the inside line.

FIG. 2.

To draw the representation of an elliptical volute. Draw the line *b a*, cutting the eye in its centre: divide 2 *g*, the diameter of the eye, into six equal parts; on *g*,

Fig. 1.

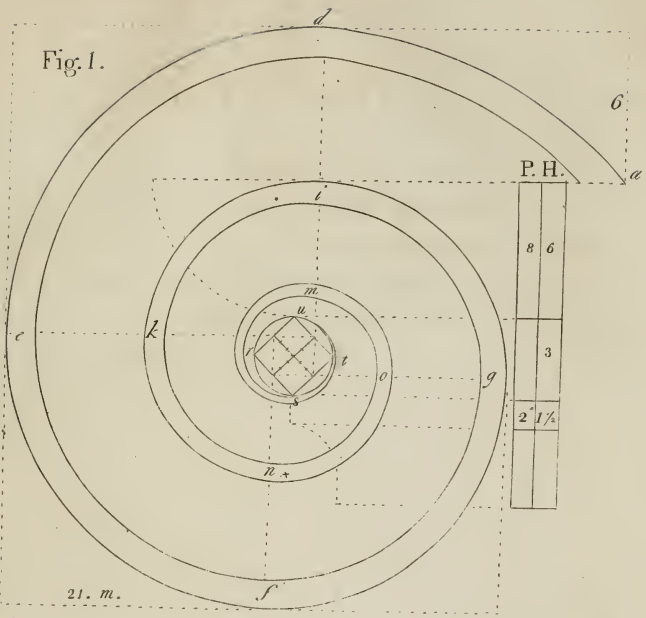
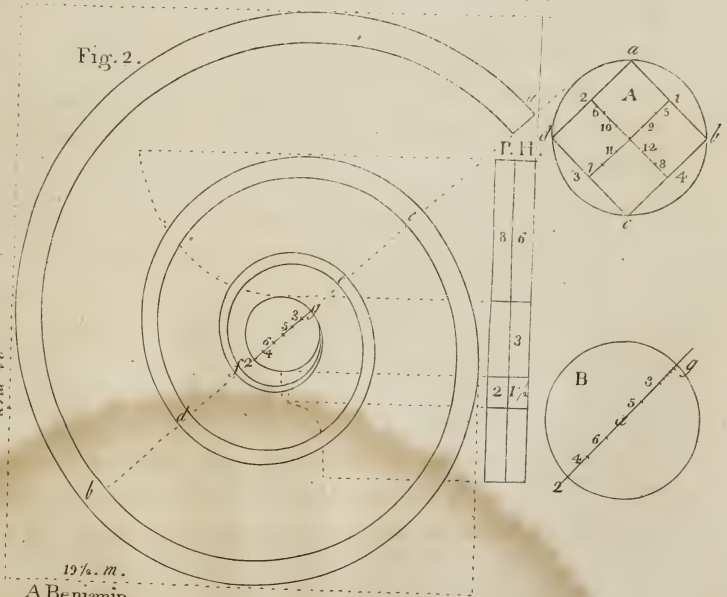


Fig. 2.



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with the distance *g a*, describe a half circle *a b ;* on 2, and with the distance 2 *b*, describe the circle *b c ;* on 3, and with the distance 3 *c*, describe *c d ;* on 4, and with the distance 4 *d*, describe *d e ;* on 5, and with the distance 5 *e*, describe *e f ;* on 6, and with the distance 6 *f*, describe *f g ;* to draw the inside line, divide one sixth of the diameter of the eye into five parts, and set one of them from *g* 2 3 4 5 and 6, toward the centre of the eye, which will be the centres for drawing the inside line. B, is the eye at large.

D

PLATES IX. AND X.

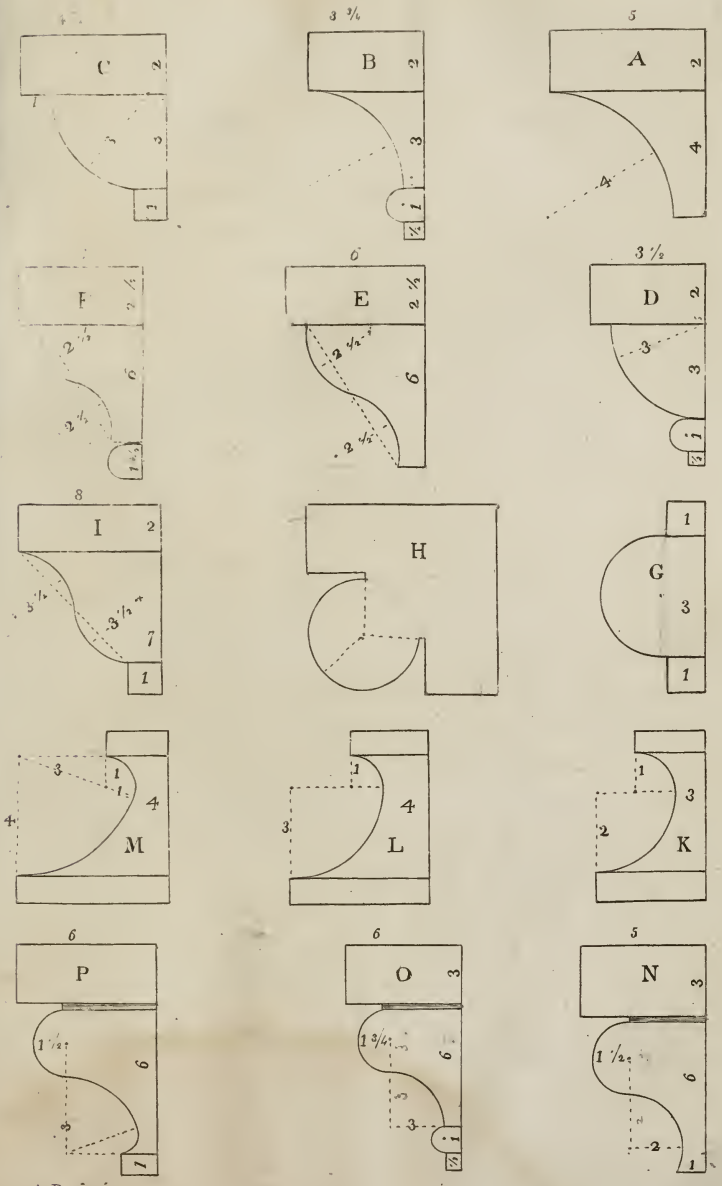
On plate 9, are fifteen, and on the lower part of plate 10, are six designs for mouldings, all of which have their particular parts figured; and the centres for drawing their curves, are marked on the plates, which, I think, will make them sufficiently plain, without any further explanation.

PLATE 10.

To describe the quirk ovolo, A. With one fourth of *i k* in your compasses, and on *d*, which is two and one half parts from the line *i k*, describe the arch *n e*, with the distance *a b*; from *a* and *e*, make the point of intersection at *c*; on *c*, describe the arch, *a e*, which completes the moulding.

The above directions will be observed in describing B and C; the only difference in them is their projections; A, projects four parts, B, five parts, and C, six parts.

To draw the quirk ovolo D, and the hollow E. Draw the lines *a b* in D and E, and divide *a b* in F, into eight parts; draw lines from each of those parts, at right angles with *a b* in F, and parallel to the fillets of D and E, cutting the lines *a b* in E, at 2 4 9 7 10 12 and 14; transfer the distances 1 2, 3 4, 5 9, 6 7, 8 10, 11 12, 13 14, in F, to 1 2, 3 4, 5 9, 6 7, 8 10, 11 12, 13 14, in D and E, and by those points trace their curves.



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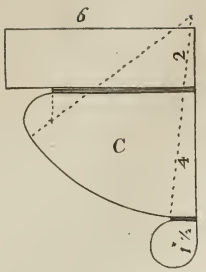

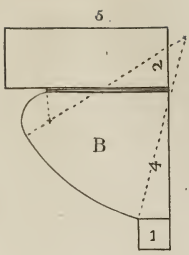

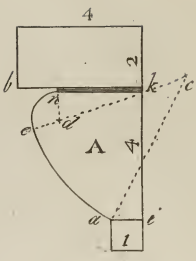

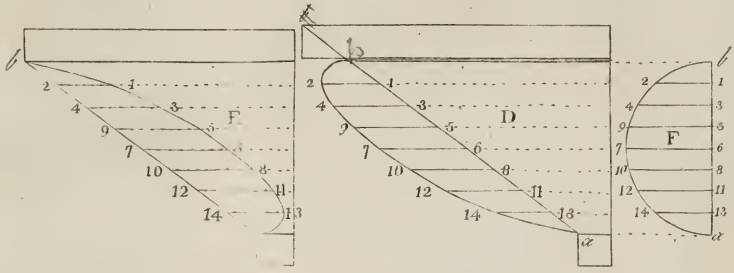

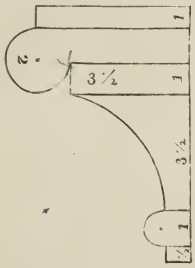

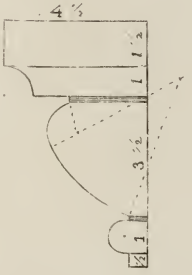

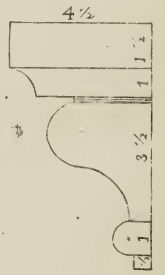

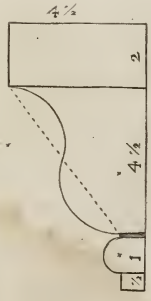

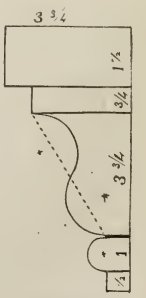

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PLATE IX.

NAMES OF MOULDINGS.

A, cavetto, or hollow; B, cavetto and astrigal; C, ovolo and fillet; D, ovolo and astrigal; E, cimareversa or ogee; F, cimareversa and bead; G, astrigal; H, bead; I, cimarecta; K, L, and M, are scoties of different projections and curves; N, O, P, are quirk on Grecian ogees.

NOTE. If mouldings are only composed of parts of a circle, and straight lines, they are called Roman; because the Romans, in their buildings, seldom, or never, employed any other curve for mouldings, than that of a circle; but if a moulding is made of part of an ellipsis, or a parabola, or an hyperbole, the mouldings are then in the Grecian taste; hence it appears, that mouldings of the Grecian taste, are of much greater variety than those of the Roman, where only parts of circles are concerned.

Although I have made use of the Roman ovolo and ogee in the orders, I do not generally use them in practice; the bending, or turning inward, of the upper edge of the Grecian, or quirk ovolo, when the sun shines on its surface, causes a beautiful variety of light and shade, which greatly relieves it from plane surfaces; and if it is entirely in shadow, but receives a reflected light, the bending, or turning inward, at the top, will cause it to contain a greater quantity of shade in that place, but softened downward around the moulding to the under edge. In the Roman ovolo there is no turning inward, at the top; therefore, when the sun shines on its surface,

it will not be so bright, on its upper edge, as the Grecian ovolo ; nor will it cause so beautiful a line of distinction from the other mouldings, with which it is combined, when it is in shadow, and when lighted by reflection.

In the Greek ogee, the turning in of its upper edge, and the turning out of its under edge, will, when the sun shines bright, cause it to be very bright on these edges, which will greatly relieve it from other perpendicular surfaces when combined together; and when it is in shadow, and lighted by reflection, the inclination of the upper and under edges will also make a strong line of distinction, on both edges, between it and other mouldings, or of planes connected with it ; whereas the upper and under edges of the Roman ogee being perpendicular to the horizon, the lightest place on its surface will not be lighter than a perpendicular plane surface; nor will it be better relieved in shadow than perpendicular plane surfaces also in shadow.

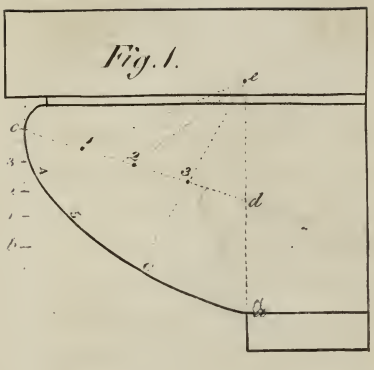


Fig. 1.
e
c
d
b
f

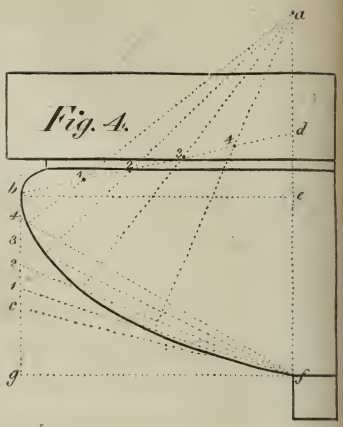


Fig. 4.
a
d
b
e
g
f

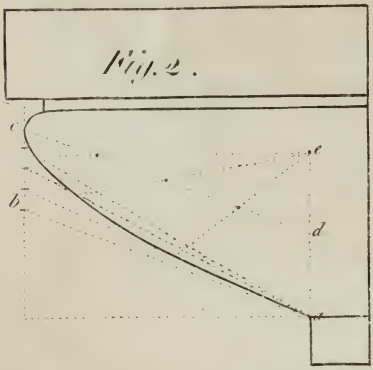


Fig. 2.
c
e
b
d
f

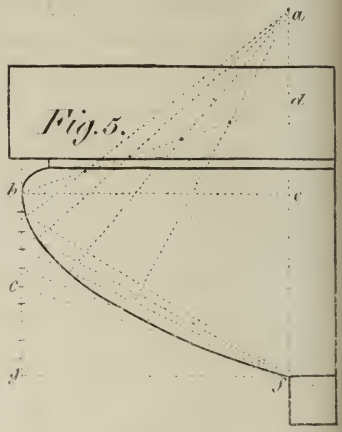


Fig. 5.
a
d
b
c
g
f

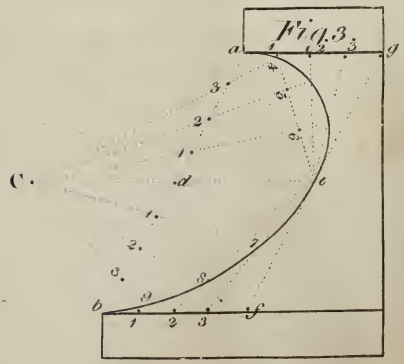


Fig. 3.
a
g
d
e
b
f

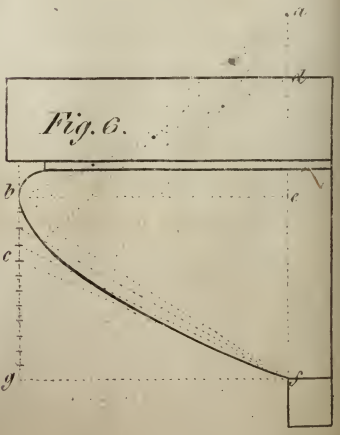


Fig. 6.
a
d
b
c
g
f

PLATE XI.

FIG. 1.

To describe the Grecian ovolo, the tangent *a b*, at the bottom, and the point of contact *a*, and the greatest projection of the moulding at *c*, being given. From *a*, draw *a d e*, perpendicular; through *c*, draw *c b* parallel to it; also, through *c*, draw *c d* parallel to the tangent *b a*, cutting *a e* at *d*; make *d e* equal to *a d*, then will *d* be the centre of an ellipsis, and *c d*, and *d a*, will be two simiconjugate diameters, from which the ellipsis may be described; divide *b c*, and *c d*, each into a like number of equal parts; from the point *a*, and through the points 1, 2, 3, in *b c*, draw lines; also from *e*, through the points 1, 2, 3, in *c d*, draw lines cutting the former at 4, 5, 6, which will give the points through which the curve is to be traced.

FIG. 2.

This figure is described in the same manner as fig. 1. it has a greater projection, the tangent being also taken in a higher position.

FIG. 3.

To describe a scotia. Join the ends of each fillet by the right line *a b*; bisect *a b* at *d*; through *d*, draw C *d e* parallel to the fillets, and make C *d*, and *d e*, each equal to the depth of the scotia; divide *d a*, *d b*, *b f*, and *a g*, each into a like number of equal parts; from the point *e*, and through the points 1, 2, 3, in *a g*, and *b f*, draw lines; also from C, through the points 1, 2, 3, in *d a*, and *d b*, draw lines, cutting the former at the points

4, 5, 6, and 7, 8, 9, through which points the curve is to be traced.

FIG. 4, 5, and 6.

Draw *g f*, a continuation of the upper side of the under fillet; through *b*, draw *b g*, perpendicular to *g f*, cutting it at *g*, and the tangent *f c*, at the point *c*; also through *b*, draw *b e* parallel to *g f*, and through *f*, draw *f e d a*, parallel to *g b*, cutting *b e* at *e*; make *e a* equal to *e f*; *e d* equal to *c g*, and join *b d*; then divide each of the lines *b c*, and *b d*, into a like number of equal parts; from the point *f*, and through the points 1, 2, 3, 4, in *b c*, draw lines; also from *a*, through the points 1, 2, 3, 4, in *b d*, draw lines, cutting the former, which will give the points required by which to trace the curve.

N. B. By these means you may make a moulding to any form you please, whether flat, or round. The difference produced in the curves of figs. 5, and 6, from that of 4, is occasioned by the tangent line *f c*, cutting *g b*, nearer to *b*, in figs. 5 and 6, than in fig. 4.

THE ORIGIN OF BUILDING.

Buildings were certainly among the first wants of mankind; and architecture must, undoubtedly, be classed among the earliest antediluvian arts. Scripture informs us, that Cain built a city; and soon after the deluge we hear of many cities, and of an attempt to build a tower that should reach the sky. A miracle stopped the progress, and prevented the completion of that bold design.

The first men, living in a warm climate, wanted no habitations; every grove afforded shade from the rays of the sun, and shelter from the dews of the night; rain fell but seldom, nor was it ever sufficiently cold to render closer dwellings than groves, either desirable or necessary, even in the hour of repose. They fed upon the spontaneous productions of the soil, and lived without care, and without labour.

But when the human species increased, and the produce of the earth, however luxuriant, was insufficient to supply the requisite food: When frequent disappointments drew on contention, with all its train of calamities, then separation became necessary, and colonies dispersed to different regions, where frequent rains, storms, and piercing cold, forced the inhabitants to seek for better shelter than trees.

At first they most likely retired to caverns, formed by nature in rocks; to hollow trunks of trees; or to holes, dug by themselves in the earth; but soon, disgusted with the damp and darkness of these habitations, they began to search after more wholesome and comfortable dwellings.

The animal creation pointed out both materials and manners of construction. Swallows, rooks, bees, and storks, were the first builders. Man observed their instinctive operations; he admired; he imitated; and being endued with reasoning faculties, and of a structure suited to mechanical purposes, he soon outdid his masters in the builder's art.

Rude and unseemly, doubtless, were the first attempts; without experience or tools, the builder collected a few boughs of trees, spread them in a conic shape, and covering them with rushes, or leaves, and clay, formed his hut; sufficient to shelter its hardy inhabitants at night, or in seasons of bad weather. But in the course of time, men naturally grew more expert; they invented tools to shorten and improve labour; fell upon neater, more durable modes of construction; and forms, better adapted than the cone, to the purposes for which their huts were intended. They felt the want of convenient habitations, wherein to taste the comforts of privacy, to rest securely, and be effectually screened from troublesome excesses of weather. They wanted room to exercise the arts, to which necessity had given birth; to deposit the grain that agriculture enabled them to raise in abundance; to secure the flocks which fre-

quent disappointments in the chace, had forced them to collect and domesticate. Thus stimulated, their fancy and hands went arduously to work, and the progress of improvement was rapid.

That the primitive hut was of a conic figure, it is reasonable to conjecture ; for of that form do the American aborigines build their wigwams ; and from its being simplest of the solid forms, and most easily constructed. And wherever wood was found, they probably built in the manner above described ; but, as soon as the inhabitants discovered the inconvenience of the inclined sides, and the want of upright space in the cone, they changed it for the cube ; and, as it is supposed, proceeded in the following manner.

Having, says Vitruvius, marked out the space to be occupied by the hut, they fixed in the ground several upright trunks of trees to form the sides, filling the intervals between them with branches, closely interwoven, and spread over with clay. The sides thus completed, four beams were laid on the upright trunks, which, being well fastened together at the angles of their junction, kept the sides firm ; and likewise served to support the covering, or roof of the building, composed of smaller trees, placed horizontally like joists ; upon which, were laid several beds of reeds, leaves, and earth, or clay.

By degrees, other improvements took place ; and means were found to make the fabric lasting, neat, and handsome, as well as convenient. The bark and other protuberances were taken from the trees that formed the sides ; these trees were raised above the dirt and

humidity, on stones; were covered at the top with other stones, and firmly bound round at both ends with ozier, or cords, to secure them from splitting. The spaces between the joists of the roof, were closed up with clay or wax, and the ends of them either smoothed, or covered with boards. The different beds of materials that composed the covering, were cut straight at the eaves, and distinguished from each other by different projections. The form of the roof too was altered; for being, on account of its flatness, unfit to throw off the rains which sometimes fell in great abundance, it was raised in the middle, on trees disposed like rafters, after the form of a gable roof.

This construction, simple as it appears, probably gave birth to most of the parts that now adorn our buildings; particularly to the orders, which may be considered as the basis of the whole decorative part of architecture; for when structures of wood were set aside, and men began to erect solid stately edifices of stone, having nothing nearer to imitate, they naturally copied the parts which necessity introduced in the primitive hut; insomuch that the upright trees, with the stones and cordage at each end of them, were the origin of columns, bases, and capitals; the beams and joists, gave rise to architraves and friezes, with their triglyphs and metopes; and the gable roof was the origin of pediments; as the beds of materials, forming the covering, and the rafters supporting them, were of cornices; with their corona, their mutules, modillions, and dentils.

OF THE PARTS WHICH COMPOSE THE ORDERS OF ARCHITECTURE,

AND OF THEIR PROPERTIES, APPLICATION, AND EMBELLISHMENTS.

As, in many other arts, so in architecture, there are certain elementary forms, which, though simple in their nature, and few in number, are the principal constituent objects of every composition, however complicated or extensive it may be.

Of these there are, in this art, two distinct sorts ; the first consisting of such parts, as represent those that were essentially necessary in the construction of the primitive huts ; as the shaft of the column, with the plinth of its base, and the abacus of its capital, representing the upright trees, with the stones used to raise, and to cover them. Likewise the architrave and triglyph, representing the beams and joists ; the mutules, modillions, and dentils, either representing the rafters, or some other pieces of timber employed to support the covering ; and the corona, representing the beds of materials which composed the covering itself. All these are properly distinguished by the appellation of essential parts, and from the first class. The subservient members, contrived for the use and ornament of these, and intended either to support, to shelter, or to unite them gracefully together, which are usually called mouldings, constitute the second class.

Of regular mouldings, there are eight, which are, the fillet, the astragal or bead, the cimareversa or ogee, the cimarecta, the cavetto or hollow, the ovolo or quarter round, the scotia, and the torus.

The names of these are allusive to their forms; and their forms are adapted to the uses which they are intended to serve. The ovolo and ogee, being strong at their extremities, are fit for supports; the cimarecta and cavetto, though improper for that purpose, as they are weak in the extreme parts, and terminate in a point, are well contrived for coverings to shelter other members; the tendency of their outline being very opposite to the direction of falling water, which, for that reason, cannot glide along their surface, but must necessarily drop. The torus and astragal, shaped like ropes, are intended to bind and strengthen the parts on which they are employed; and the use of the fillet and scotia, is only to separate, contrast, and strengthen the effect of the other mouldings: to give a graceful turn to the profile; and to prevent that confusion, which would be occasioned by joining several convex members together.

An assemblage of essential parts and mouldings, is termed a profile; and on the choice, dispositions, and proportions of these, depend the beauty or deformity of the composition. The most perfect profiles, are such as consist of few mouldings, varied both in form and size; fitly applied, with regard to their uses, and so distributed, that the straight and curved ones, succeed each other alternately. In every profile, there should be a predominant member, to which all the others ought to seem subservient; and made, either to support, to fortify, or to

shelter it from injuries of weather ; and whenever the profile is considerable, or much complicated, the predominant should always be accompanied with one, or more, other principal members ; in form and dimension, calculated to attract the eye ; create momentary pauses ; and assist the perception of the beholder. These predominant and principal members, ought always to be of the essential class, and generally rectangular. Thus, in a cornice, the corona predominates ; the modillions and dentils are principals in the compositions ; the cima-recta and cavetto, cover them ; the ovolo and ogee, support them.

When ornaments are employed to decorate a profile, some of the moulding should always be left plain, in order to form a proper repose ; for when all are enriched, the figure of the profile is lost in confusion. In the entablature, the corona should not be ornamented ; nor the modillion band ; neither should the plinths of columns, fillets, nor scarcely any square members be carved ; for, generally speaking, they are either principal in the composition, or used as boundaries to other parts ; in both which cases, their figures should be simple, distinct, and unembarrassed. The dentil band should remain uncut, where the ovolo and ogee immediately above and below it are enriched ; for when the dentils are marked, the three members are confounded together, and being covered with ornaments, become far too rich for the remainder of the composition, which are defects, at all times, studiously to be avoided ; as a distinct outline, and an equal distribution of enrichments, must, on every occasion be strictly attended to.

Ornaments should neither be too frugally employed, nor distributed with too much profusion; their value will increase, in proportion to the judgment and discretion shown in their application.

Variety in ornaments should not be carried to an excess. In architecture they are only accessories; and therefore they should not be too striking, nor capable of long detaining the attention from the main object. Those of the mouldings in particular, should be simple, uniform, and never composed of more than two different representations upon each moulding; which ought to be cut equally deep; be formed of the same number of parts; all nearly of the same dimensions, in order to produce one even uninterrupted hue throughout; so that the eye may not be more strongly attracted by any part in particular, than by the whole composition.

All the ornaments in the entablature are to be governed by the modillions, or mutules; and the distribution of them must depend on the intervals of the columns; and be so disposed, that one of them may come directly over the axis of each column. It is farther to be observed, that the ornaments must partake of the character of the order they enrich; those used in the Doric and Ionic orders, are to be of simple forms, and of larger bulk than those employed in the Corinthian or Composite.

When friezes, or other larger members, are to be enriched, the ornaments may be significant, and serve to in-

dicate the destination, or use of the building ; the rank, qualities, profession, and achievements of the owner.

In sacred places, all obscene, grotesque, and heathenish representations ought to be avoided ; for indecent fables, extravagant conceits, or instruments and symbols of pagon worship, are very improper ornaments in structures consecrated to christian devotion,

With regard to the manner of executing ornaments, it is to be remembered, that, as in sculpture, drapery is not estimable, unless its folds are contrived to grace and indicate the parts and articulations of the body it covers ; so in architecture, the most exquisite ornaments lose all their value, if they load, alter, or confuse the form they are designed to enrich and adorn.

The method of the ancient sculptors, in the execution of architectonic ornaments, was, to aim at a perfect representation of the object they chose to imitate ; so that the chesnuts, acorns, or eggs, with which the ovolo is commonly enriched, are, in the antiques, cut round, and almost entirely detached ; as are likewise the berries, or beads, on the astragal, which are generally as much hollowed into the solid of the body, as the moulding projects beyond it ; but the leaves, shells, and flowers, that adorn the cavetto, cima, ogee, and torus, are kept flat, like the things they represent.

In the application of their ornaments, they observed to use such as required a considerable relief, on mouldings, that in themselves are clumsy, as the ovolo and astragal; which, by means of the deep incision made in them to form these enrichments, acquired an extra-

ordinary lightness ; but on more elegant parts, as the cavetto, and cima, they employed thin bodies, which could be represented without entering too far into the solid. The ornaments of their cornices were boldly marked, that they might be distinguished from afar ; but those of the bases of columns, or of pedestals, being nearer the eye, were more slightly expressed ; as well on that account, as because it would have been improper to weaken these parts, and impossible to keep them clean, had there been any deep cavities in them to harbour dust or filth.

When objects are near, and liable to close inspection, every part of the ornament should be expressed, and well finished ; but when they are much exalted, the detail may be slightly touched, or entirely neglected ; for it is sufficient if the general form be distinct, and the principal masses strongly marked. A few rough strokes from the hand of a skilful master, are much more effectual than the most elaborate finishings of an artless imitator ; which, seldom consisting in more than smoothing and neatly rounding off the parts, are calculated to destroy, rather than to produce effect.

OF THE ORDERS OF ARCHITECTURE

IN GENERAL.

The orders of architecture, as has been observed, are the basis upon which the whole decorative part of the art is chiefly built, and toward which the attention of the artist must ever be directed, even where no orders are introduced. In them, originate most of the forms used in decoration; they regulate most of the proportions; and to their combination, multiplied, varied and arranged, in a thousand different ways, architecture is indebted for its most splendid productions.

These orders are different modes of building, said, originally, to have been imitated from the primitive huts; being composed of such parts as were essential in their construction, and afterward also in the temples of antiquity; which, though at first simple and rude, were, in the course of time, and by the ingenuity of succeeding architects, wrought up and improved, to such a pitch of perfection, that they were, by way of excellence, distinguished by the name of Orders.

Of these there are five; three said to be of Grecian origin, are called Grecian orders; being distinguished by the names of Doric, Ionic, and Corinthian; they exhibit three distinct characters of composition; supposed to have been suggested by the diversity of character in the human frame. The remaining two, being of Italian origin, are called Latin orders; they are distinguished by the names

of Tuscan and Roman, and were probably invented with a view of extending the characteristic bounds, on one side, still farther toward strength and simplicity; as on the other, toward elegance and profusion of enrichments.

At what time the orders were invented, or by whom improved to the utmost, remains, at least, doubtful. And of their origin little is known but from the relation of Vitruvius; the veracity of which has been much questioned, and is, probably, not much to be depended on.

"Dorus," says he, "son of Helenes and the nymph Optica, king of Achaia and of all the Peloponnesus, having formerly built a temple to Juno, in the ancient city of Argos; this temple happened to be in the manner which is called Doric; and was afterwards imitated in many others, built in the several cities of Achaia.

"About the same time, the Athenians, after having consulted the oracle of Apollo, at Delphos, by the common consent of all Greece, sent into Asia thirteen colonies, each under the command of a separate captain; but all under the general direction of Ion, son of Xuthus and Creusa. Ion being arrived in Asia, conquered all Caria, and founded thirteen large cities; the inhabitants whereof, having expelled the Carians and Leleges, called the country Ionia, in honour of Ion, their leader; and erected temples, of which the first, dedicated to Apollo Panionius, was built after the manner of those they had seen in Achaia, which they called Doric, because temples of the same sort had been erected in the cities of the Dorians.

"But some time after, building a temple to Diana, different from these, and of a more delicate structure; being formed upon the proportions of a female body, as the Doric had been on those of a robust man; and adorning the capitals of their columns with volutes, to represent the curls of a woman's hair; and the shafts with flutings, to express the folds of her garment. They gave to this second manner of building the name of Ionic; because it was invented, and first used by the Ionians.

"The third sort of columns, which are called Corinthian, and represent the delicate figure of a young girl, owe their birth to the following accident.

"A young woman of Corinth being dead, her nurse placed on her tomb a basket, containing certain trinkets in which she delighted, when alive; covering it with a tile to shelter them from the weather. The basket happened accidentally to be set on a root of the acanthus, which, pushing forth its leaves and sprigs in the spring, covered the sides of it; and some of them, longer than the rest, being obstructed by the angles of the tile, were forced downward, and, by degrees, curled into the form of volutes.

"Callimachus, a celebrated sculptor, passing near the tomb, observed the basket, and in how graceful a manner the leaves of the acanthus had surrounded it; the form pleased him exceedingly; he imitated it on the tops of some columns, which he afterward executed at Corinth; establishing and regulating, by this model, the manner and proportions of the Corinthian order."

Of the two Latin orders, the Tuscan is said to have been invented by the inhabitants of Tuscany, before the Romans had intercourse with the Greeks, or were acquainted with their arts; whence it is called Tuscan. Probably, however, these people, originally a colony of Greeks, only imitated, in the best manner they could, what they remembered in their own country; simplifying the Doric, either to expedite their work, or, perhaps, to adapt it to the abilities of their workmen.

The second Latin order, though of Roman production, is but of modern adoption; the ancients never having considered it as a distinct order. It is a mixture of the Ionic and Corinthian; and is now distinguished by the names of Roman, or Composite.

The ingenuity of man has hitherto not been able to produce a sixth order, though large premiums have been offered, and numerous attempts been made, by men of the first rate talents, to accomplish it. Such is the fettered human imagination; such the scanty store of its ideas, that Doric, Ionic, and Corinthian, have ever floated uppermost; and all that has ever been produced, amounts to nothing more than different arrangements and combinations of their parts.

An order is composed of two principal members; the column, and the entablature; each of which is divided into three principal parts. Those of the column are the base, the shaft, and the capital. Those of the entablature are the architrave, the frieze, and the cornice. All these are again subdivided into many smaller parts; the disposition, number, forms, and dimensions, of which, character-

ize each order, and express the degree of strength or delicacy, richness or simplicity peculiar to it.

The simplest, and most solid of all, is the Tuscan. It is composed of few, and large parts, devoid of ornaments; and is of a construction so massive, that it seems capable of supporting the heaviest burdens.

There is no regular example of this order among the remains of antiquity. Piranisi has given a drawing of a Tuscan base, found at Rome, but of what date is uncertain. Vitruvius, in an indistinct manner, has mentioned its general proportions; but through his whole book does not refer to one structure of this order. The Trajan and Antonine columns at Rome are reckoned of the Tuscan order; they have eight diameters for their height; the torus and capitals are certainly more ornamented than is consistent with Tuscan plainness. The fluting to the necks also are after the most ancient Doric examples. It is somewhat singular there should be no remains of this order; and were it not for what little Vitruvius has written of it, it certainly might have been lost to the moderns. The plainness of its appearance, no doubt, caused it to be neglected at Rome; but in no other place has been discovered any truly ancient example.

As this order conveys ideas of strength, and rustic simplicity, it may very properly be used for rural purposes; for farmhouses, barns, sheds, stables, and green-houses; for gates of parks and gardens; for prisons, arsenals; also, in colonades and porticoes, surrounding squares, markets, and granaries, or storehouses; and, generally,

wherever magnificence is not required, and expence is to be avoided.

The design here annexed, and also the Doric, Ionic, Corinthian, and Composite orders, I have selected from several authors, and have made all the alterations, that in my opinion, were necessary to render them conformable to the practice of the present time.

The Doric order, next in strength to the Tuscan, and of a grave, robust, masculine aspect, is, by Scamozzi, called the Herculean. Being the most ancient of all the orders, it retains more of the structure of the primitive huts, in its form, than any of the rest; having triglyphs in the frieze to represent the ends of joists; and mutules in its cornice, to represent rafters, with inclined soffits, to express their direction in the originals, from whence they were imitated. Its column too, is often seen in ancient works executed without a base, in imitation of the trees, used in the first buildings, without any plinths to raise them above the ground. Delicate ornaments are repugnant to its characteristic solidity, and it succeeds best in the simple regularity of its proportions. Nosegays and garlands of flowers grace not a Hercules, who always appears more becomingly, with a rough club and lion's skin. For there are beauties of various sorts and often so dissimilar, in their natures, that those which may be highly proper on one occasion, may be quite the reverse, even ridiculously absurd, on others.

The ancients employed the Doric in temples dedicated to Minerva, to Mars, and to Hercules; whose grave

and manly dispositions, suited well with the character of this order. Serlio says it is proper for churches dedicated to Jesus Christ; to St. Paul, St. Peter, or any other saints, remarkable for their fortitude, in exposing their lives, and suffering for the christian faith. It may be employed in the houses of generals, or other martial men; in mausoleums erected to their memory; likewise in all kinds of military buildings; as arsenals, gates of fortified places, guard-rooms, and similar structures.

The Ionic, being the second of the Grecian orders, holds a middle station between the other two; and stands in equipoise between the grave solidity of the Doric, and the elegant delicacy of the Corinthian. Among the antiques, however, we find it in different dresses; sometimes more simple, and bordering on Doric plainness, all according to the fancy of the architect, or nature of the structure where employed. It is, throughout, of a more slender construction than either of the aforedescribed orders; its appearance, though simple, is graceful and majestic; its ornaments should be few, rather neat than luxuriant.

As the Doric order is, particularly in churches or temples, dedicated to male saints, so the Ionic is, principally, used in such as are consecrated to females of the matronal state. It is likewise employed in courts of justice, in libraries, colleges, seminaries, and other structures, having relation to arts or letters; and in private houses; and in all places dedicated to peace and tranquillity. The ancients employed it in temples sacred to Juno, to Bacchus, to Diana, and other deities, whose dispo-

sitions held a medium between the severe and the effeminate.

The Corinthian. Its proportions are elegant in the extreme ; every part of the order is divided into a great variety of members ; and abundantly enriched with a diversity of ornaments. The ancients, says De Chambray, aiming at the representation of a feminine beauty, omitted nothing, either calculated to embellish, or capable of perfecting their work. And he observes, that in many examples left of this order, such a profusion of different ornaments is introduced, that they seem to have exhausted imagination in the contrivance of decorations for this masterpiece of the art.

The ancients frequently employed the Ionic entablature in the Corinthian order, as appears by many of the buildings ; and sometimes, according to Vitruvius, even the Doric.

When the modillion cornice is employed on large concave surfaces, the sides of the modillions and coffers of the soffit, should tend toward the centre of the curve ; but when the concave is small, it will be better to direct them toward the opposite point in the circumference, that the contraction may be less perceptible, and the parts dependant thereon, suffer less deviation from the natural form. The same rules must be observed with regard to dentils, to the abacus and bases of columns of pilasters, and likewise to the flanks, of the pilaster itself. But on a convex surface, the sides of all these should be parallel to each other ; for it would be unnatural, and very disagreeable, to see them narrowest where they spring out of the cornice, diverging as they advance

forward, forming sharp angles, and a sort of mutilated triangular plan, with enlarged solids, and diminished intervals ; all calculated to destroy the usual proportions and beauty of the composition.

The Corinthian order is proper for all buildings, where elegance, gaiety, and magnificence are required. The ancients employed it in temples dedicated to Venus, to Flora, Proserpine, and the nymphs of fountains ; because the flowers, foliage, and volutes, with which it is adorned, seemed well adapted to the delicacy and elegance of such deities. Being the most splendid of all the orders, it is proper for the decoration of squares, or galleries and arcades, surrounding them ; for churches ; and, on account of its rich, gay, and graceful appearance, it may, with propriety, be used in theatres, in ball or banquetting rooms, and in all places consecrated to festive mirth, or convivial recreation.

Care must be taken in Corinthian, as well as in Composite capitals, that the feet of the lower leaves do not project beyond the upper part of the shaft of the column ; because they then hide a considerable part of the upper row of leaves, and give a stunted disagreeable form to the whole capital. The different divisions of the acanthus leaf, and bunches of olive or parsley, which compose the total of each leaf, must be firmly marked, and massed in a very distinct manner ; the stems that spring from between the upper leaves, are to be kept low upon the vase of the capital, while rising between the leaves, then spring gradually forward, to form the different volutes.

The Composite, or Roman order, certainly owes its origin to that constant solicitude after novelty, which ever renders the mind of man restless in an enlightened and highly cultivated age. The desire of variety and novelty, either of new invention, or combination, certainly engaged the Roman architects to unite with the proportions and enrichments of the Corinthian order, the angular volute, and dentils of the Ionic, and by this union to compose a new order.

The introduction of the angular Ionic volute, and the omission of the upper row of leaves in the capital, certainly give it a more bold and noble aspect, than that of the Corinthian capital, yet different from any of the other orders, possessing an elegance and projection very pleasing, and may be used with very agreeable and happy effect.

There are many examples remaining at Rome, which show the general estimation of this order there, in the height of its splendour and prosperity. In their triumphal arches it was used with good effect, where it produced an agreeable boldness, uniting elegance and ornament.

The example here given of the column, its base and capital, is that executed in the triumphal arch, erected in honour of Vespasian and Titus at Rome.

The entablature is nearly a copy of that of Sir William Chambers.

The cornice differs from the Corinthian, only in the modillions, which are square, and composed of two fascias. The soffit of the intervals between the dentils,

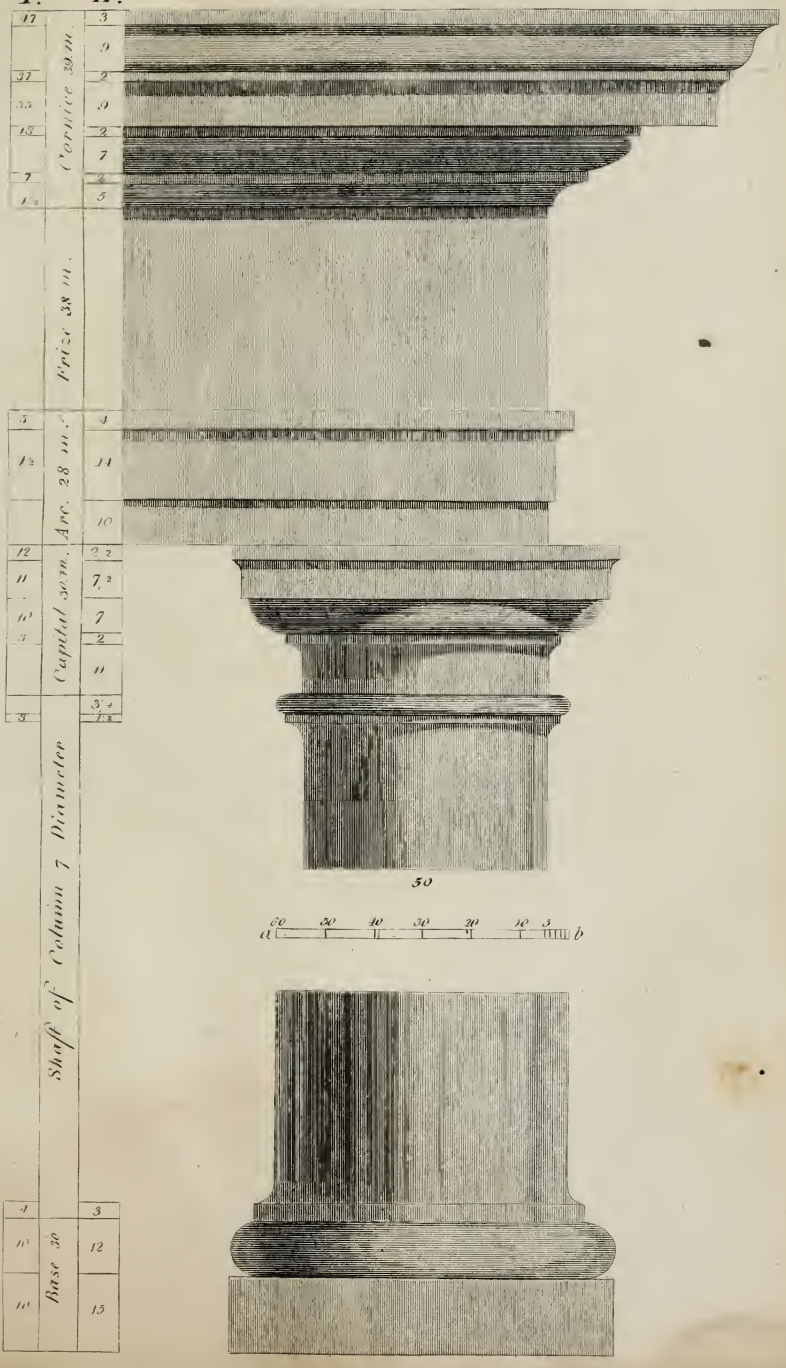
may be hollowed upward behind the little fillet in front, which occasions a dark shade, that marks the dentil more distinctly. And the same method may be observed in the Ionic and Corinthian orders, for the same reason. The roses in the soffit of the corona, are not to project beyond its horizontal surface.

The Romans used the Composite order more frequently in their triumphal arches, than in any other buildings; meaning to express their dominion over those nations that invented the orders of which this is composed. It may, with propriety, be used, wherever elegance and magnificence are to be united; but it is more particularly adapted to buildings, designed to commemorate signal events, or, to celebrate the virtues and achievements of conquerors and legislators; because the capitals, and other ornaments, may be composed of emblems, and of allusive representations.

PLATE XII.

To draw the Tuscan order to any given height. Suppose twelve feet. Divide it into thirty-nine equal parts; each part will be three inches, five eighths, and about one sixteenth. Take four of these parts for the diameter of the column, just above its base, which will be fourteen inches, and three quarters. Of that length make the scale of minutes, *a b*. First divide the line *a b* into twelve equal parts; then one twelfth, as 5 *b*, into five parts, each of which is called one minute. It is to be remembered, that each member of the order is so many minutes of this scale, either in height, or projection. Under H, figures are placed against each member of the order, which give the number of minutes it is high. Under P, are to be found the number of minutes, which each member of the order projects. If it be necessary to add a subplinth, divide the whole height into forty-three equal parts: and, as before, make the diameter of the column equal to four of those parts. Give one diameter to the height of the subplinth. If a pedestal be required, divide the whole height into forty-eight equal parts, four of which will be the diameter of the column. Give nine to the height of the pedestal, which will be two diameters, fifteen minutes. The column is eight diameters high; and the height of

Tuscan Order



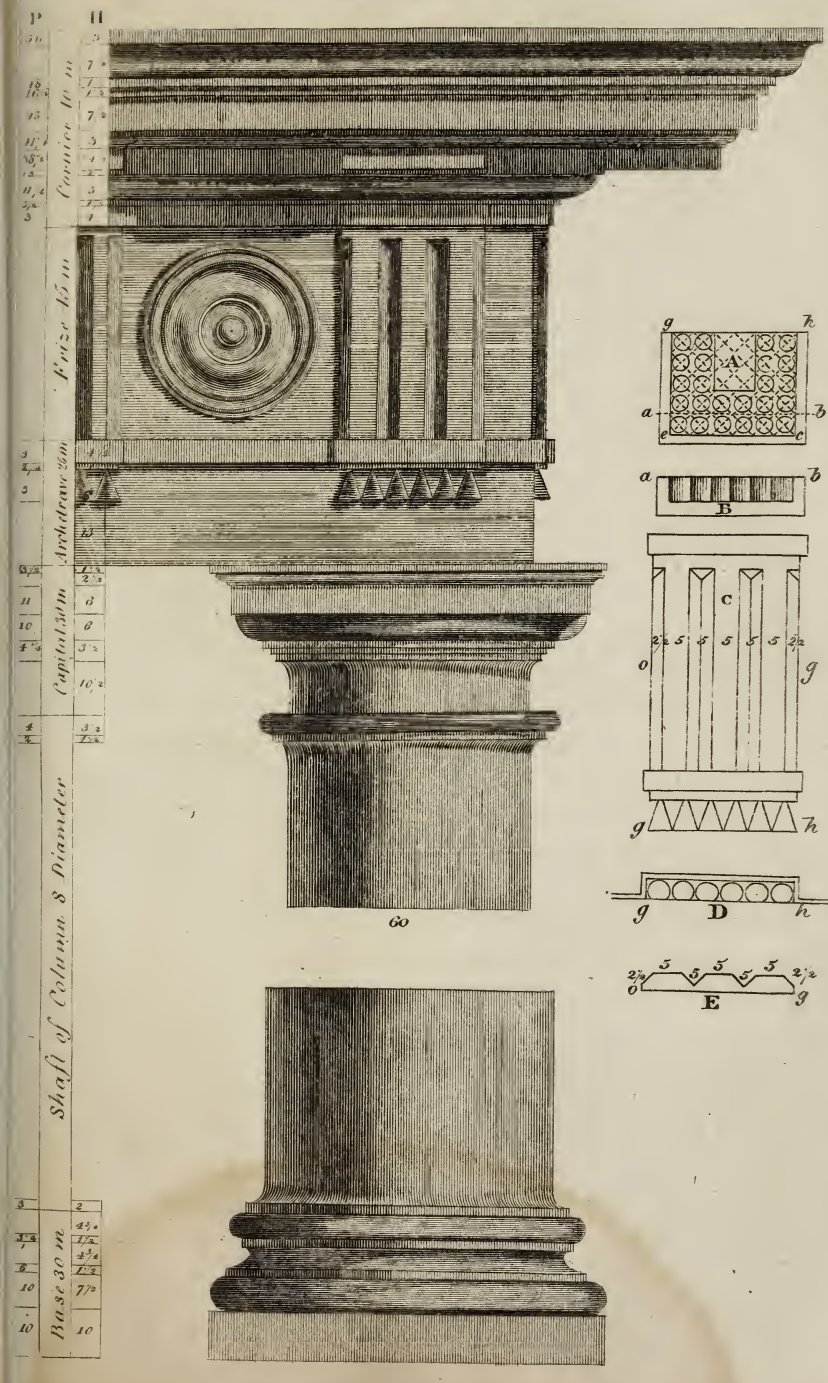
the entablature, is one hundred and five minutes, or one diameter and forty-five minutes. NOTE. The directions here given, for making a scale of minutes, must be strictly attended to, in making that for the Doric, Ionic, Corinthian, and Composite orders.

PLATE XIII.

To draw the Doric order. Divide the whole height into sixty-five equal parts, six of which, are equal to the diameter of the column, just above its base. Make the scale of minutes to draw it by, of that length, as before directed, in the Tuscan order. If it be required to add a subplinth; divide the height into seventy-one equal parts; give six of them, as before, to the diameter of the column, and one diameter to the height of the subplinth. If it be necessary to execute this order on a pedestal; divide the height into eighty parts, six of which will be the diameter of the column. Make the pedestal, two diameters and thirty minutes high. The column, including base and capital, is nine diameters high, and the entablature, one diameter and fifty-one minutes high.

A represents the planceer of the mutule. Divide *g h*, and *e c*, each into six equal parts; also *c h*, and *e g*, each, into five equal parts. Draw diagonal lines across the mutule, and through each of those divisions, the intersection of which will make the centres for drawing the bells. B represents a section of the mutule, taken from *a* to *b*, on A. C represents the front view of a triglyph. Divide its breadth into twelve equal parts; give one to each half channel on the outsides; two for each space, or interval; and two for each channel; and two parts will remain for the middle space. Every two parts is the width of a bell; the sides of each, if continued, would ter-

Doric Order


P
M
Cornice 16 m
Frize 15 m
Architrave 15m
Capital 15m
Shaft of Column 8 Diameter
Base 30 m
A
B
C
D
E

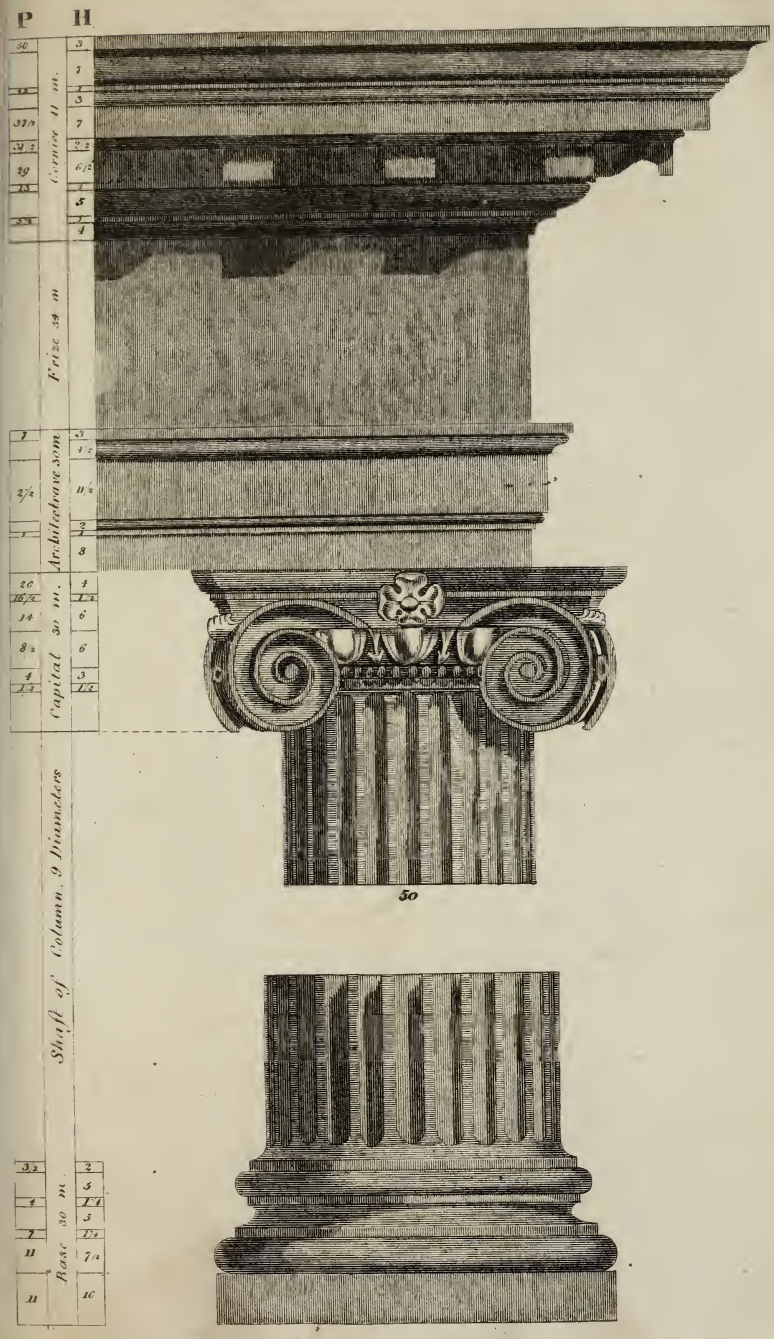
minate in a point, at the top of the fillet above them. **D** shews the planceer, or lower end of the bells ; also the under edge of the fillet above them. **E** is a section of the triglyph. From *o* to *g*, the triglyphs and mutules, are each thirty minutes wide, and seventy-five minutes from centre to centre. The centre of one, of each, must always be placed exactly over the centre of a column. The spaces between the triglyphs, called metopes, are always square, and may he left plain, or enriched with pateras, or oxheads, according to fancy. When the column is fluted, it has twenty in number, and those without fillets ; for that, and the diminishing of the column, see Plate 7th. The distance between columns in this order, must be regulated by the triglyphs in the entablature. Two diameters thirty minutes between the central lines, take two triglyphs ; three diameters forty-five minutes, take three triglyphs ; five diameters, take four triglyphs ; six diameters fifteen minutes, take five triglyphs ; seven diameters thirty minutes, take six triglyphs.

The diameter of the neck of this column (and also that of all the other orders) is fifty minutes, of course they diminish ten minutes each.

PLATE XIV.

TO DRAW THE IONIC ORDER.

Divide the whole height into forty-seven equal parts, four of those parts are equal to the diameter of the column ; the column, including its base and capital, is ten diameters high ; the height of the entablatures is one diameter and forty-five minutes. If it be required to proportion this order on a subplinth ; divide the height into fifty-one parts, give four to the diameter of the column : make the subplinth one diameter high. If a pedestal be required, divide the height into twenty-nine equal parts, two of which are equal to the diameter of the column. Make the pedestal two diameters and forty-five minutes high ; make the modillions ten or eleven minutes in front, place them thirty-one minutes from centre to centre. To draw its planceer, see Plate 20, *fig.* 2. In placing the columns of this order, due regard must be had to the modillions in the cornice. They must be so arranged that the central line of each one will be exactly under that of a modillion. It will also be necessary to pay due regard to the above directions, in placing the columns of the Corinthian, and Composite orders.


P
H
Cornice 11 m.
Frize 34 m
Architrave 30m
Capital 30 m.
Shaft of Colum. 9 Diameters
Base 30 m.
50

Corinthian Order

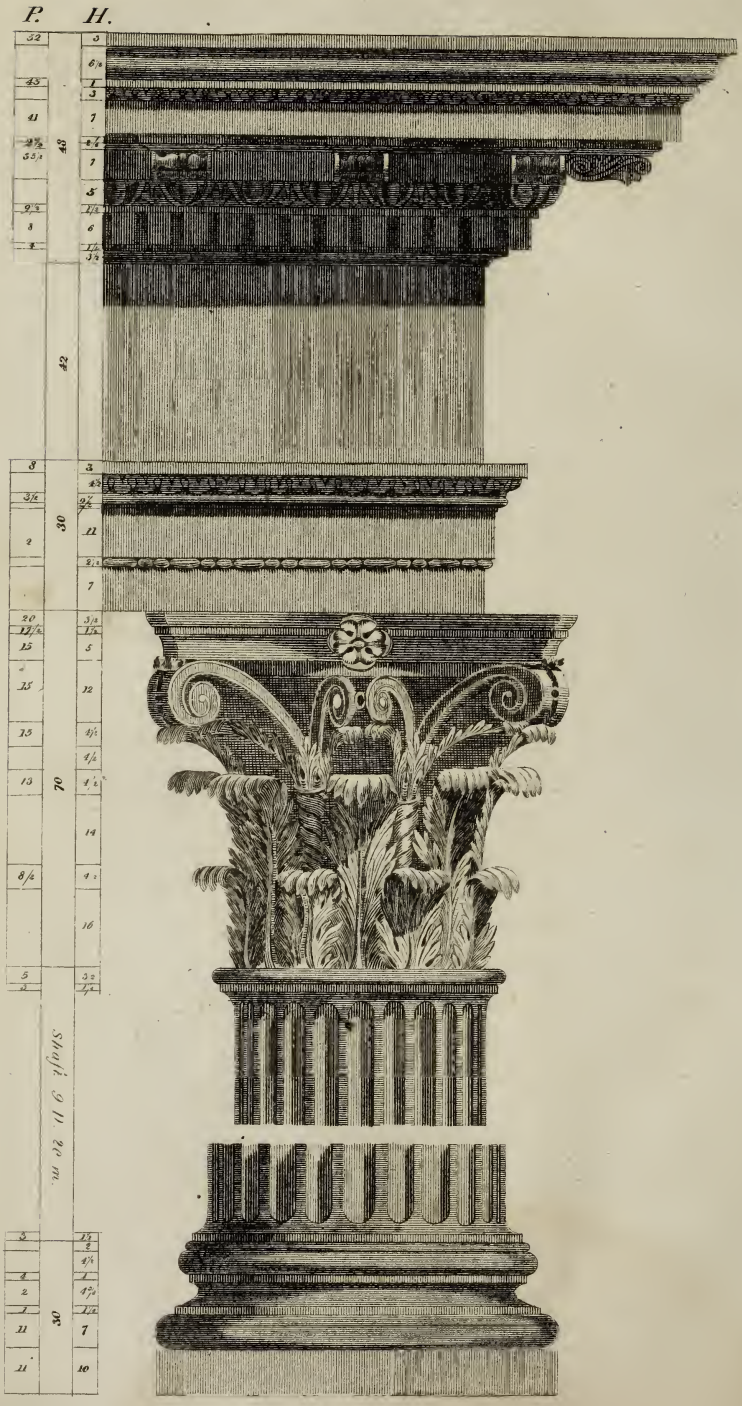


PLATE XV.

TO DRAW THE CORINTHIAN ORDER.

Divide the height into twenty-six equal parts, two of which will be equal to the diameter of the column ; if on a subplinth, divide the height into twenty-eight equal parts, give two of them to the diameter, and make the subplinth one diameter high. If a pedestal be added, divide the height into thirty-two equal parts as before ; give two to the diameter of the column, and three diameters to the height of the pedestal. The entablature is two, and the column eleven diameters high. The modillions are thirteen minutes in front, and must be placed thirty-five minutes from centre to centre. I have given this order, Palladio's Ionic base, for the sake of variety, but the Attic base, may with propriety be used, in this, and all the other orders, except the Tuscan.

PLATE XVI.

To draw the Composite order. Divide its height into seventy-nine parts ; take six of them for the diameter of the column. If a subplinth be required, divide it into eighty-five parts, take six as before, for the diameter ; make the subplinth one diameter. If a pedestal is necessary, divide it into ninety-seven parts, take six for the diameter, give the pedestal three diameters.

The modillions are eleven and a half minutes in front, measuring on the lower facia ; and thirty-eight minutes from centre to centre. Their planceer may be embellished with eight bells each, like those of the Doric mutule ; see *a* and *c*.—*b* represents a pannel sunk up into the planceer between the modillions.

I have, in imitation of the ancients, and likewise the moderns, given certain rules for the height of columns ; although experience has convinced me, that no determinate rule will answer in all cases for their proportion. They must be proportioned according to the weight, or apparent weight which they sustain. It would be absurd to make stone columns which support, besides their entablature, a whole story of a brick or stone building (as is the case of those in front of the Custom House in this town) as many diameters in height, as those which have only their entablature to support, and that, and the columns made of wood ; which is the case with the greater part of columns in porticos and colonades, in this country.

Composite Order.

Wightman Sc.

Columns when coupled, or in pairs, may be made smaller, than when single ; and they may generally be made one, or one and a half diameter higher than here laid down, when made of wood, and to appearance having but little to support. There are situations, when made of wood, which require them to be larger than here laid down ; as in steeples, cupolas, and all other situations when placed at a great distance from the eye. When columns are placed in front of a building, they ought to stand in front of the piers, and never before windows or doors. When placed one above another, the diameter of the upper one should be equal to that of the neck of the lower one. Always place the lightest order on the top, the largest being best able to support. Place the Doric, on the Tuscan ; the Ionic, on the Doric ; the Corinthian and Composite, on the Ionic.

PLATE XVII.

Shews the method for glueing up the Ionic capital. A represents the plan for a column, and B for that of a pilaster. The pieces for the horns ought to be glued upright with the wood, it being best for the carving. To draw the plan of the abacus ; set off at each angle, as at *c d*, ten minutes with the distance *d b* ; and on *d* and *b*, make the intersection at *a* ; and on *a*, make the arch *d b*, and with the same distance complete the three remaining sides of the abacus. C shows an angular elevation of the capital, when put together. D also shews the body of the cap with the mouldings turned, before the horns are glued on.

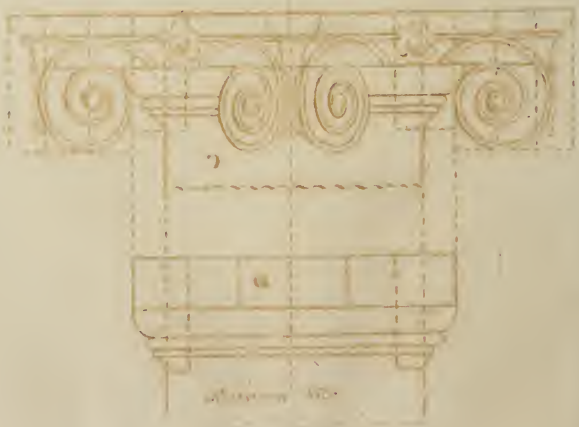
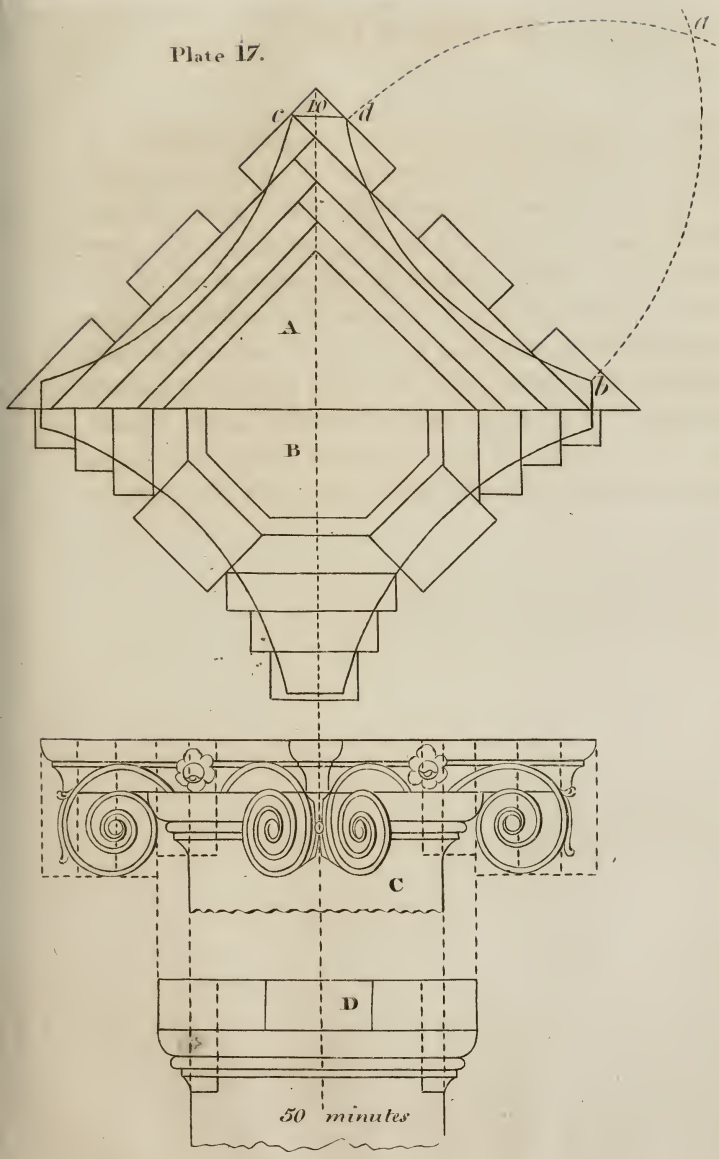
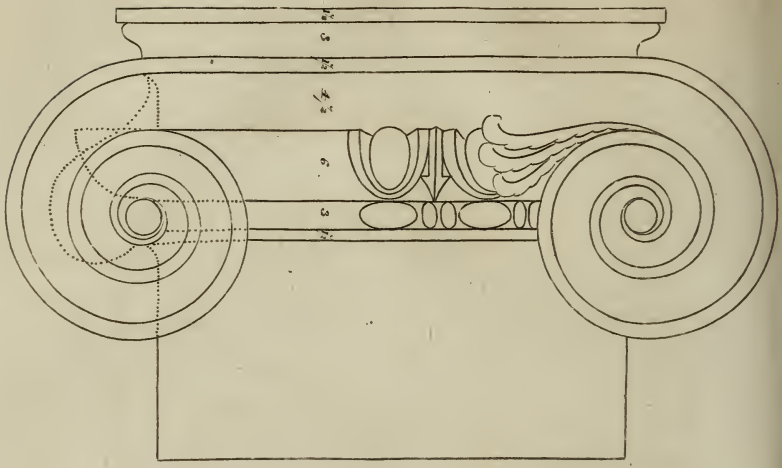
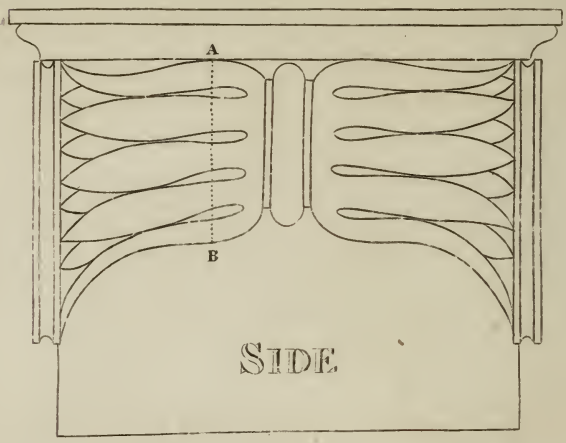


Plate 17.

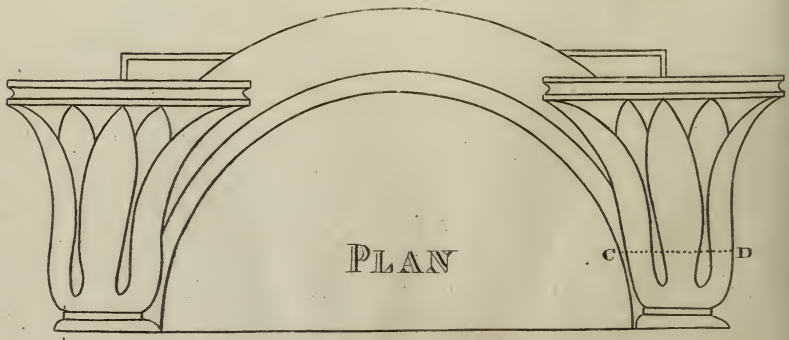


Roman Ionic





Side



Plan

PLATE XVIII.

Shows the front side, and plan of the Roman Ionic capital. The upper part of the astragal is equal in thickness, and in height, to the eye of the volute ; the height of the ovolo above, is, from the upper side of the eye, to the upper side of the fillet, in the second revolution ; the projection of the cincture, or hollow under the fillet of the astragal, is equal to the height of the fillet ; and the projection of the bead is a semicircle ; make the ovolo, a quarter of a circle, its projection is from the perpendicular line of the fillet. The dotted line upon the volute, is a section through the side at A B, or through the plan at C D ; the ornamental part is drawn by hand.

PLATE XIX.

Shows an angular view of the Corinthian capital, also two plans, one for a column, and the other for a pilaster. Make A B C D the upper part of the elevation which contains the abacus, and volutes solid. The leaves are two and a half minutes thick at their base, and must be glued on with the grain upright. The bell, of course, will be five minutes less in diameter, than the shaft of the column at its neck. Make the bell project six minutes at the top, draw the abacus by the same directions as are given for that of the Ionic.

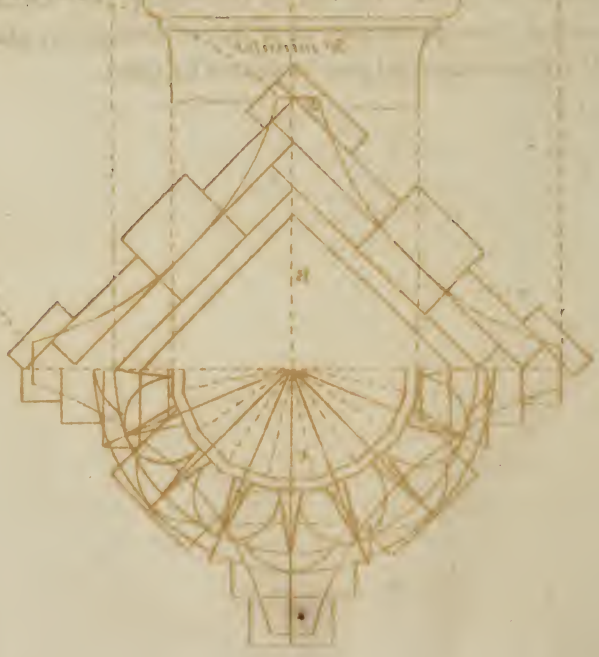
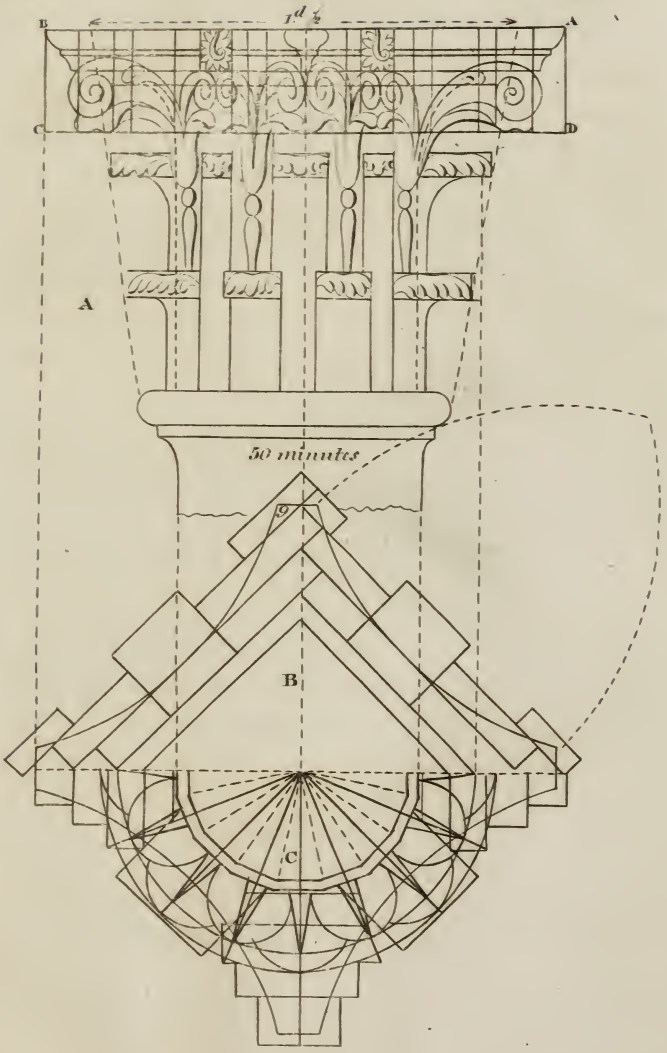


Plate 19.



OF PILASTERS.

Pilasters are, I believe, a Roman invention. The Greeks employed antæ in their temples to receive the architraves where they entered upon the walls of the cell. These, though they were in one direction of equal diameter with the columns of the front, were, in flank, extravagantly thin in proportion to their height; and neither their bases nor capitals bore any resemblance to those of the columns they accompanied. The Roman artists, disgusted, probably, with the meagre aspect of these antæ, and the want of accord in their bases and capitals, substituted pilasters in their places; which, being proportioned and decorated in the same manner with the columns, are certainly more seemly, and preserve the unity of the composition much better.

They differ from columns in their plan only, which is square, as that of the column is round. Their bases, capitals, and entablatures, have the same parts, with all the same heights and projections, as those of columns; and they are distinguished in the same manner, by the names of Tuscan, Doric, Ionic, Corinthian, and Composite. Columns are certainly the most perfect. Nevertheless, there are occasions, in which pilasters may be employed with great propriety; and some, where they are, on various accounts, even preferable to columns.

Engaged pilasters are employed in churches, galleries, halls, and other interior decorations, to save room; for

as they seldom project beyond the solid of the walls, more than one quarter of their diameter, they do not occupy near so much space, even as engaged columns. They are likewise employed in exterior decorations; sometimes alone, instead of columns, on account of their being less expensive.

When pilasters are used alone, as principal in the composition, they should project one quarter of their diameter beyond the walls, which gives them a sufficient boldness, and in the Corinthian and Composite orders, is likewise most regular; because the stems of the volutes, and the small leaves in flank of the capital, are then cut exactly through their centres.

When pilasters are placed behind columns, and very near them, they need not project above one eighth of their diameter, or even less; when they are on a line with columns, their projection is to be regulated by that of the columns; and consequently, it can never be less than a semidiameter, even when the columns are engaged as much as possible. This extraordinary projection, however, will occasion no very great deformity, as the largest apparent breadth of the pilaster will exceed the least, only in the ratio of eleven to ten, or thereabouts. But if columns be detached, the angular pilaster should always be coupled with a column, to hide its inner flank; because the pilasters will otherwise appear disproportionate, when seen from the point of view proper for the whole building, especially if it be small, and the point of view near.

It is sometimes customary to execute pilasters without any diminution; diminished pilasters are, however,

on many accounts, much preferable. There is more variety in their form; their capitals are better proportioned, both in the whole, and in their parts, particularly in the Corinthian and Composite orders; and the irregularities, occasioned by the passage of the architraves, from diminished columns, to undiminished pilasters, are thereby avoided; as are likewise the difficulties of regularly distributing the modillions and other parts of the entablature, either when the pilasters are alone, or accompanied with columns.

The shafts of pilasters are sometimes adorned with flutings, in the same manner as those of columns; the plan of which may be a trifle above a semicircle, and they must be to the number of seven on each face, which makes them nearly of the same size with those of the columns. The interval between them must be either one third, or one fourth of the flute in breadth.

The capitals of Tuscan or Doric pilasters, are profiled in the same manner as those of the respective columns; but in the capitals of the other orders, there are some trifling differences to be observed. In the antique Ionic capital, the extraordinary projection of the ovolo makes it necessary, either to bend it inward considerably toward the extremities, that it may pass behind the volutes, or instead of keeping the volutes flat in front, as they commonly are in the antique, to twist them outward till they give room for the passage of the ovolo.

The same difficulty subsists, with regard to the passage of the ovolo behind the angular Ionic volutes.

What has been said with regard to the passage of the ovolo behind the volutes in the Ionic order, is likewise to be remembered in the Composite ; and in the Corinthian, the lip, the edge of the vase or basket, may be bent a little inward toward its extremities ; by which means, it will easily pass behind the volutes. The leaves in the Corinthian and Composite capitals, must not project beyond the top of the shaft. The diameter of the capital must be exactly the same as that of the top of the shaft ; and to make out the thickness of the small bottom leaves, their edges may be bent a trifle outward ; and the large angular leaves may be directed inward, in their approach toward them. In each front of the Composite of Corinthian pilaster capital, there must be two small leaves, with one entire, and two half large ones ; and wrought in the same manner as those of the columns are ; the only difference being, that they will be somewhat broader.

The employing of half, or other parts of pilasters, that meet, and, as it were penetrate each other, in inward or outward angles, should, as much as possible, be avoided, because it generally occasions several irregularities in the entablatures.

OF PEDIMENTS.

A pediment consists of a horizontal cornice, supporting a triangular, or curvilineal space, either plain or adorned, called the tympan, which is covered either with two portions of straight, inclined cornice, or with one curvilineal cornice, following the direction of its upper outline.

Pediments owe their origin, most probably, to the inclined roofs of the primitive huts. Among the Romans they were used only as coverings to their sacred buildings, till Cæsar obtained leave to cover his house with a pointed roof, after the manner of temples. In the remains of antiquity we meet with two kinds of them, viz. triangular and circular. The former of these are promiscuously applied to cover small or large bodies ; but the latter being of a heavier figure, are never employed but as coverings to doors, niches, windows, or gates, where the smallness of their dimensions compensates for the clumsiness of their form.

It is to be observed, that the cimarecta, and fillet above it, of the cornice, are always omitted in the horizontal one of a pediment ; that part of the profile being directed upward to finish the inclined cornices. This difference of direction, increases the height of the cimarecta very considerably, and makes it far too large for the other parts of the entablature ; to obviate which, it will always be better, whenever the whole object is covered with a

pediment, to make the profile of the cimarecta lower than usual, by which means it may, notwithstanding the increase occasioned by the difference of its direction, be made of a size suitable to the rest of the cornice. But if the inclined cornice of the pediment be, on each side, joined to the horizontal ones, the only good method of lessening the abovementioned deformity is, to give very little projection to the cimarecta ; by which means the increase in its height may be rendered very trifling.

The modillions, mutules, dentils, and other ornaments of the inclined cornice, must always answer perpendicularly over those of the horizontal cornice, and their sides be always perpendicular to the horizon.

The proportion of the pediments depends upon their size ; for the same proportion will not succeed in all cases. When the base of the pediment is short, its height must be increased ; and when long, it must be diminished ; for if a small pediment be made low, the inclined cornice, which is always of the same height, whatever may be the dimension of the pediment, will leave little or no space, for the tympan ; consequently, little, or no plain repose, between the horizontal and inclined cornices. And if a large pediment be made high, it will have too lofty a tympan, and the whole composition will appear straggling, and too heavy for that which is to support it. The best proportion for the height, is from one fifth to one quarter of the base, according to the extent of the pediment, and the character of the body it serves to cover.

The face of the tympan is always placed on a line perpendicular with the face of the frieze; and, when large, may be adorned with sculpture, representing the arms or cypher of the owner; trophies of various kinds, suited to the nature of the structure; but, when small, it is much better left plain.

PLATE XX.

Fig. 1 represents the planceer of the Ionic cornice at an external angle. Fig. 4 is also a representation of the Doric cornice, at an external angle,—*a b c* and *d* are representations of pannels, which are sometimes used in the planceer of that cornice, when it is very large and near the eye, but it generally succeeds best plain.

Fig. 5 represents the planceer of a mutule of this order, which has already been explained. Fig. 2 shews the side and end view of the Ionic modillion ; to draw it, divide *a* 6 into six equal parts on 4 ; make the arch 5 *i* on *c*, which is one and a half parts from 4 ; make the arch *i n* with the same distance on *n* and 1 ; make the intersection at *a* and on *a* complete its curves.

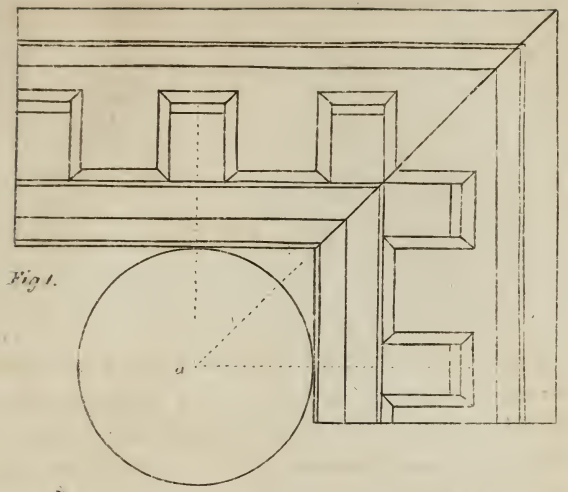

a

Fig 1.

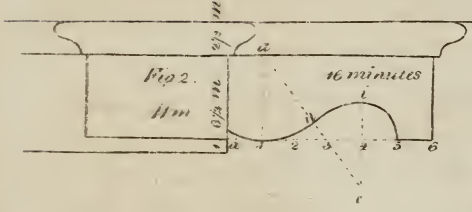
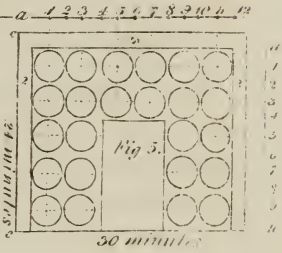


Fig 2.
16 minutes
a
1
2
3
4
5
6
c


a
1 2 3 4 5 6 7 8 9 10 11 12
Fig 3.
24 minutes
30 minutes

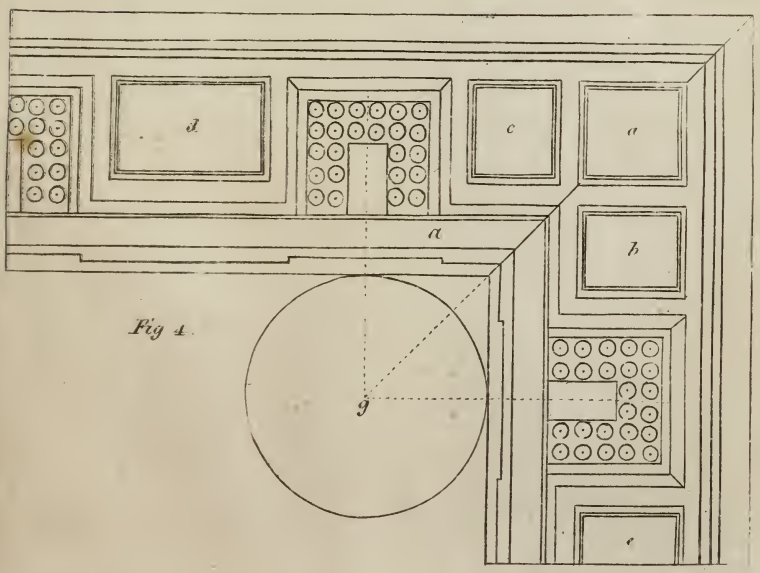
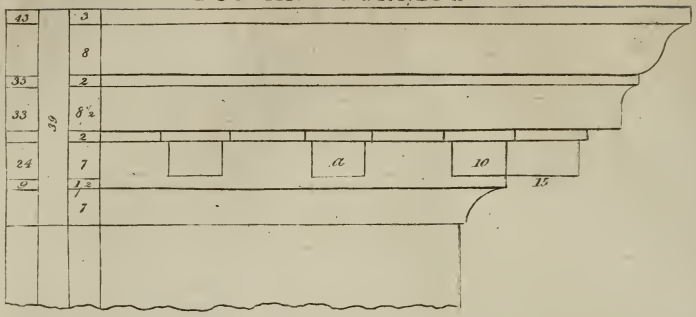
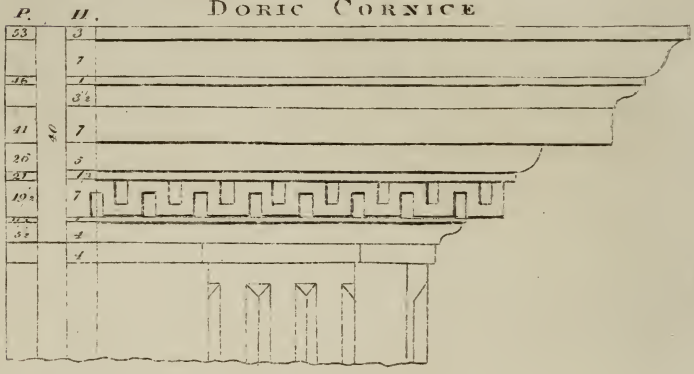

d
c
a
a
b
g
e

Fig 4.

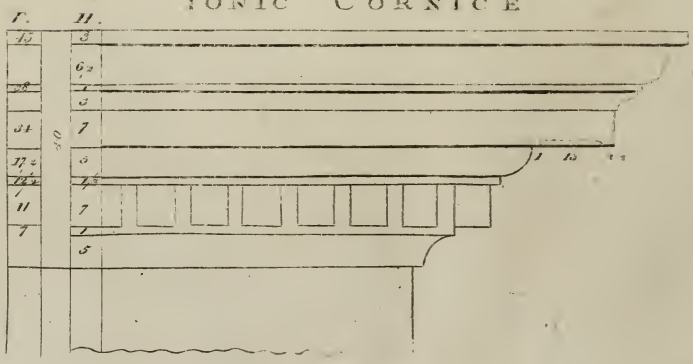
TUSCAN CORNICE



DORIC CORNICE



IONIC CORNICE



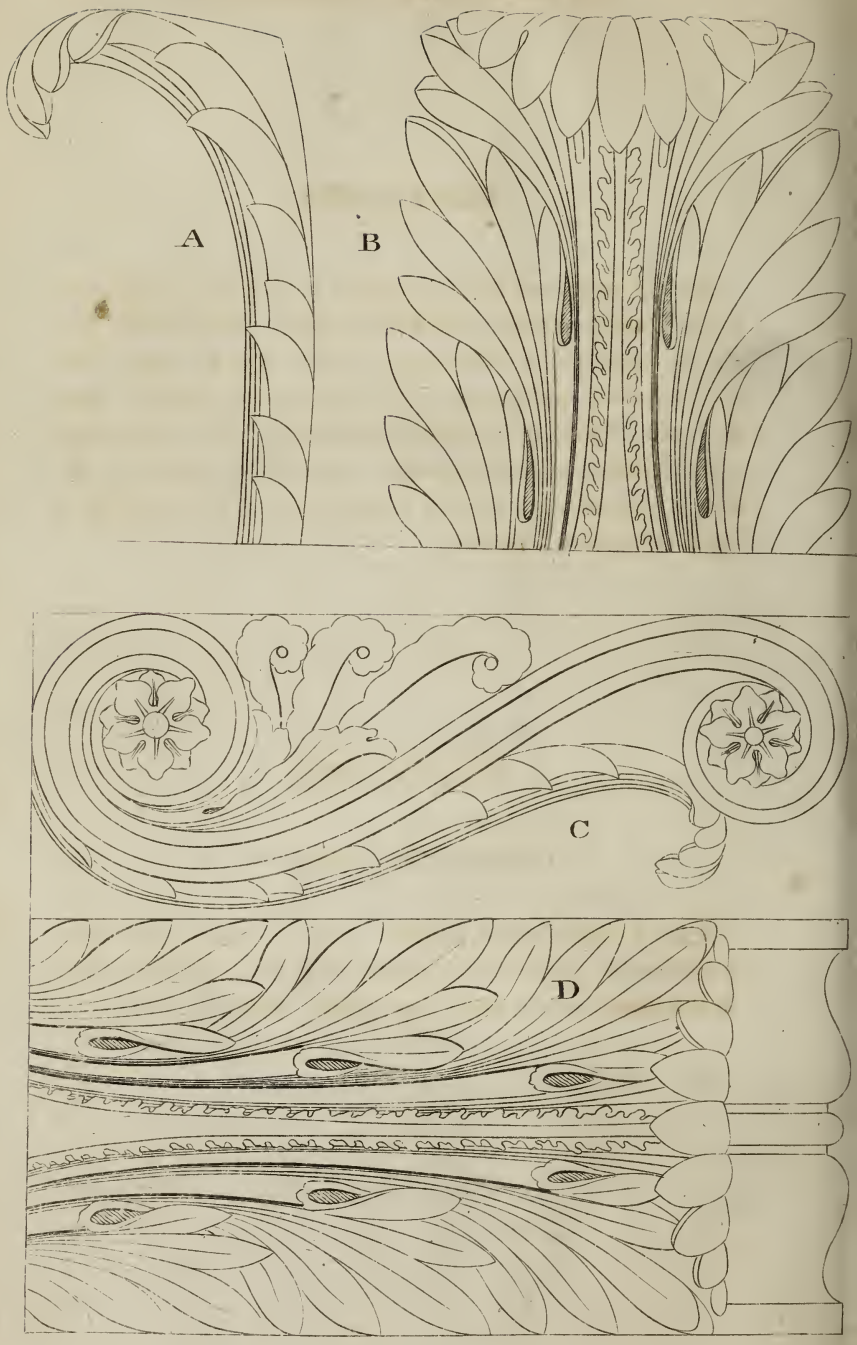

A
B
C
D

PLATE XXI.

On this plate are three examples for cornices, belonging to the Tuscan, Doric, and Ionic orders. That of the Tuscan is represented with blocks, which may be used with success when small, and at a considerable distance from the eye. Those of the Doric, and Ionic, are represented with dentils, and are proper for inside finishing, &c. Draw each of them from a scale, made on the diameter of their respective columns.

PLATE XXII.

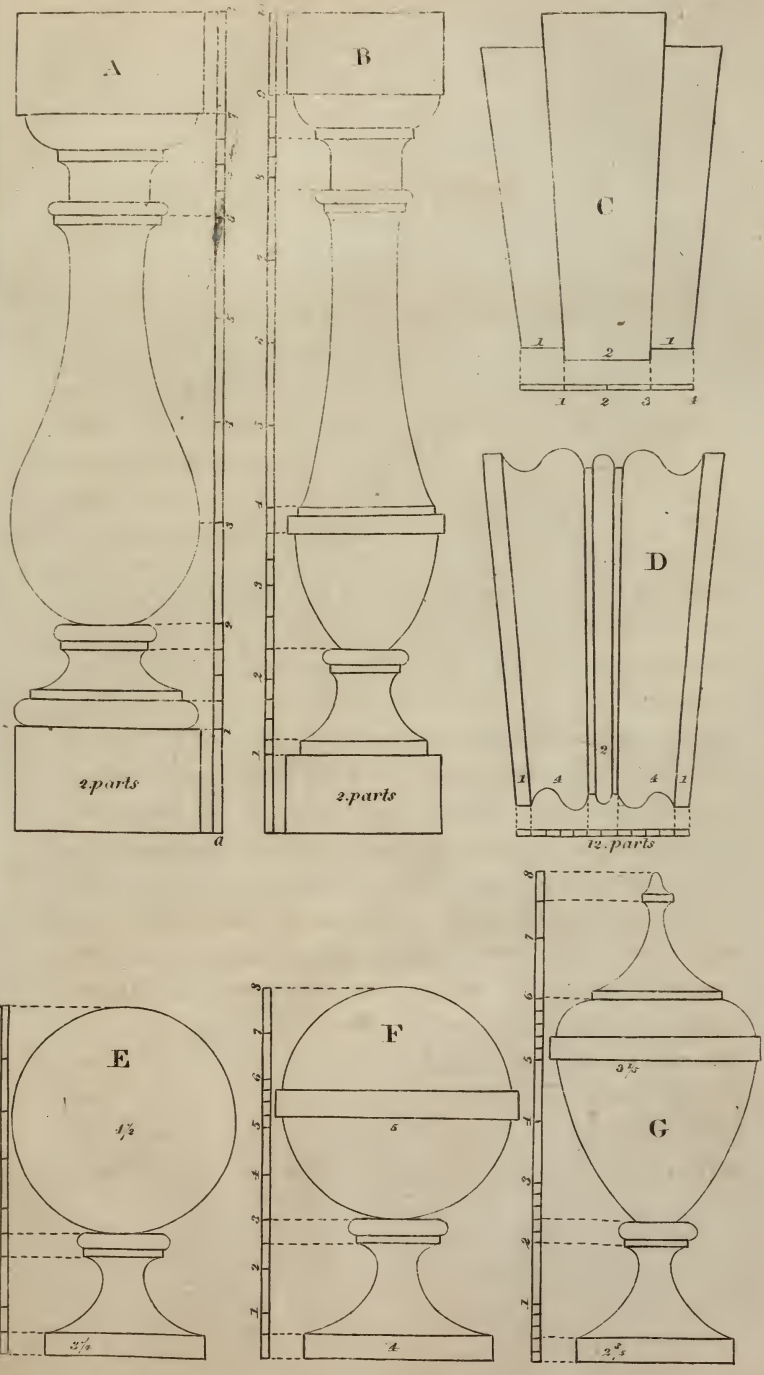
DESIGNS FOR LEAVES, &c.

Fig. A represents a profile. Fig. B a front view of a leaf, for the Corinthian capital. Fig. C a side view. Fig. D the planceer of a modillion of that order.

PLATE XXIII.

DESIGNS FOR BANISTERS, URNS, AND KEY-STONES.

Fig. A represents a banister four diameters high. Divide it into eight parts, see line *a* 8, one of which is the height of its plinth. Divide from fig. 1 to 2 into four parts—give one to the torus—two to the fillet and scotia—and one to the astrigal. Give one eighth to the abacus or square at the top. Divide from 6 to 7 into four parts—give two of them to the ovolo and fillet; and two to the necking and astrigal. Fig. B represents a banister five diameters high. Its particular parts will not require any further explanation than that which is given of A. Fig. B is perhaps a better representation for ballustrades, where columns are not concerned, than that of A. It may therefore sometimes be proper to give it six or seven diameters, where the banisters are long and near the eye. The distance in the clear between them, should never exceed one half of their diameters. Always place half of a banister next to the pedestal. Banisters, when used for ballustrades, may be considered as a pedestal; and they, together with the buse and cornice of a pedestal, when placed over an order may be equal in height with the entablature on which it stands. There is no situation which requires it to be made lower, but there are some which


A
2 parts
a
B
2 parts
C
1
2
1
1 2 3 4
D
1 4 2 4 1
12 parts
E
4½
2½
F
5
4
G
3½
2⅝

make it necessary to exceed that height. The plinth of the ballustrade, should be placed exactly over the face of the wall, or frieze of the entablature on which it is to stand. Fig. C is a design for a key-stone. Its width may be about one eleventh part of the arch, in which it is placed. Fig. D is likewise a design for a key-stone. The width of this should be about one sixteenth of the arch, in which it is placed. Figs. E F and G are examples for urns. The whole height of E is divided into seven equal parts. Those of F and G each, into eight equal parts; and those parts divided again, so as to give the proportions of their particular parts. It will be best, generally, to make their greatest diameter about three fourths the diameter of the pedestal, or post, on which they are to stand. Judgment is however to be exercised in proportioning them, so that they may appear to the best advantage. Likewise for those of banisters and keystones, for the same proportion, will not succeed, equally well in all situations.

PLATE XXIV.

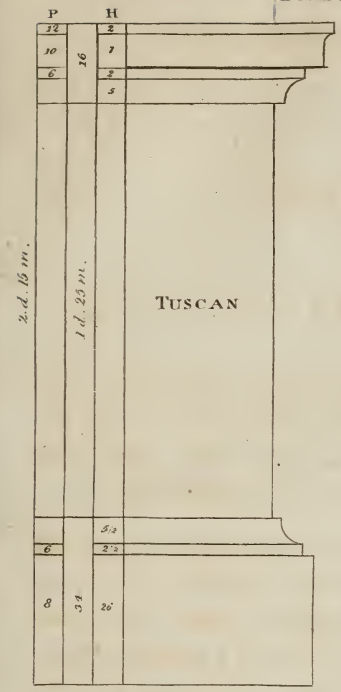
OF PEDESTALS.

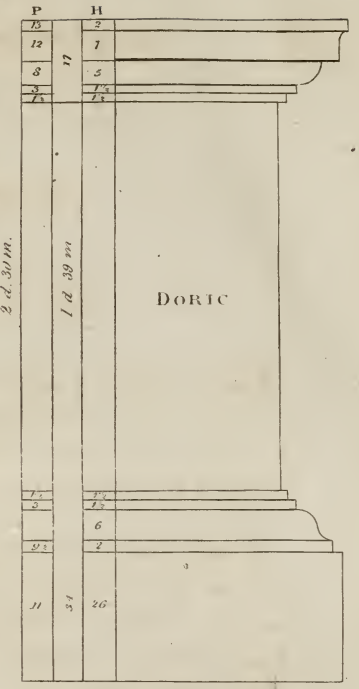
I have judged it more regular to treat of the pedestal as a separate body ; having no more connection with the order, than as an attic, a basement, or any other part with which it may, on some occasions, be accompanied.

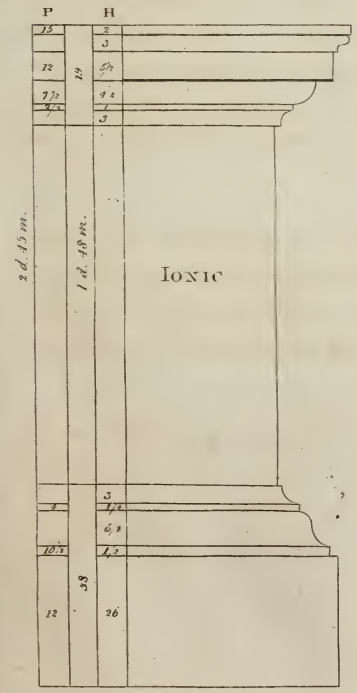
A pedestal, like a column or an entablature, is composed of three principal parts ; which are, the base, the dye, and the cornice. The dye is always of nearly the same figure, being constantly either a cube, or a parallelopiped; but the base and cornice are varied, and adorned with more or fewer mouldings, according to the simplicity or richness of the composition in which the pedestal is employed ; hence pedestals are, like columns, distinguished by the names of Tuscan, Doric, Ionic, Corinthian, and Composite.

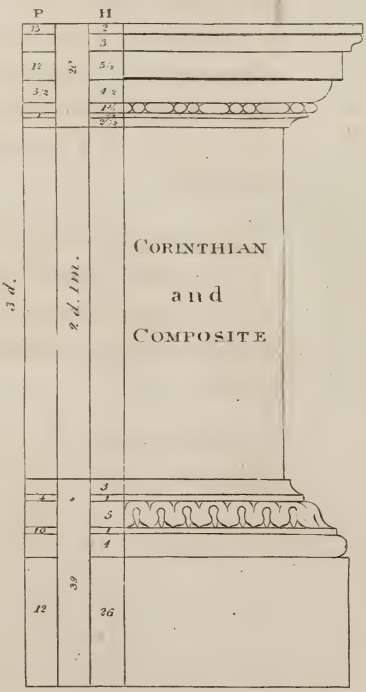
Some authors are very averse to pedestals, and compare a column raised on a pedestal, to a man mounted on stilts ; imagining that they were first introduced merely through necessity, and for want of columns of a sufficient length.

With regard to the proportion which their height ought to bear, to that of columns they are to support, it is by no means fixed ; the ancients and moderns too, having in their works, varied greatly in this respect, and adapted


P
H
2. d. 15 m.
1 d. 25 m.
TUSCAN


P
H
2 d. 30 m.
1 d. 39 m.
DORIC


P
H
2 d. 15 m.
1 d. 48 m.
IONIC


P
H
3 d.
2 d. 1 m.
CORINTHIAN
and
COMPOSITE

their proportion to the occasion, or to the respective purposes for which the pedestals were intended.

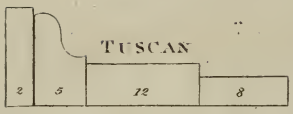
I have given the Tuscan, two diameters, fifteen minutes ; the Doric, two diameters, thirty minutes ; the Ionic, two diameters, forty-five minutes ; the Corinthian and Composite, three diameters each, in height ; but it is not necessary to adhere always to this proportion ; it is, however, to be observed, that when pedestals are profiled under each column, and the dye is much less than a square in height, the pedestal has a clumsy appearance ; and when a pedestal of the same kind exceeds one third of the height of the column, it has a lean, unsolid, tottering aspect. But if they are continued without any breaks, this need not be attended to ; though, indeed, there are very few occasions, in which pedestals, higher than one third of the column, ought to be suffered ; as they lessen too much the parts of the order, and become themselves too principal in the composition.

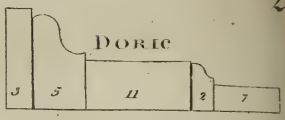
The plan of the dye is always made equal to that of the plinth of the column.

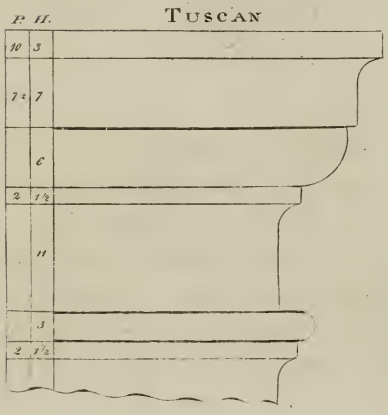
It is sometimes customary to adorn dyes of pedestals with projecting tablets, or with panels sunk in, and surrounded with mouldings. The former of these practices ought seldom to be admitted, as these tablets alter the general figure of the pedestal, and when they project much, give it a heavy appearance. The latter should be reserved for large pedestals only.

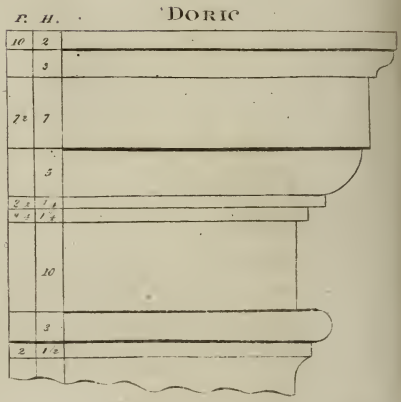
With regard to the application of pedestals, it must be observed, that when columns are entirely detached,

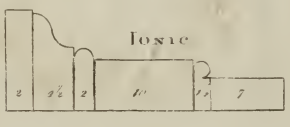
and at a considerable distance from the wall, as when they are employed to form porches, or porticoes, they should never be placed on detached pedestals; for then they may indeed be compared to men mounted on stilts, as they have a very weak and tottering appearance.

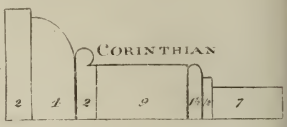

TUSCAN
2
5
12
8

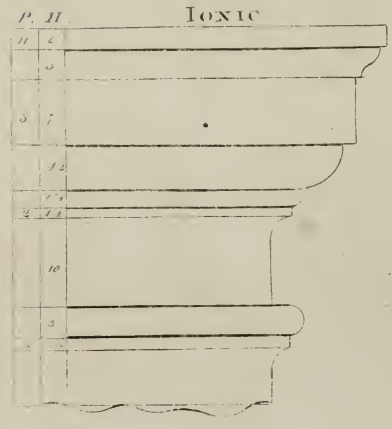

DORIC
3
5
11
2
7


P. H.
TUSCAN
10
3
7½
7
6
2
1½
11
3
2
1½


P. H.
DORIC
10
2
3
7½
7
5
10
3
2
1½


IONIC
2
2½
2
10
1½
7


CORINTHIAN
2
4
2
9
1½
7


P. H.
IONIC
11
6
3
7
2
1½
10
3

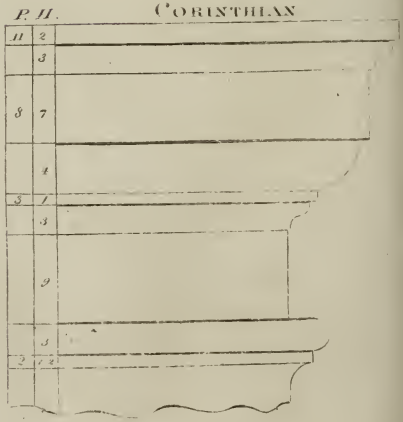

P. H.
CORINTHIAN
11
2
3
8
7
4
3
1
3
9
3
2
1½

PLATE XXV.

On this plate are four designs for impost mouldings. To draw them to a given height, divide that height into twenty, or from that to twenty-three equal parts, as judgment may dictate, one of which will be the height of the impost; divide it into as many parts, as are contained in the impost to be drawn; then each member, either in height or projection, is so many parts of that division, as are figured on the plate.

PLATE XXVI.

DESIGN FOR A FRONTISPIECE IN THE TUSCAN ORDER.

The door is four feet wide, and eight feet high. Divide its height into fifteen equal parts, each of which, will be equal to one half of the diameter of the column. Place the central line of each column, or pilaster, as the case may be, one diameter from the opening of the door. Make the pitch of the pediment, equal in height to two ninths of its extreme width. Make the height of the subplinths equal to the thickness of the first step. In this example, I have chosen to let the whole of the mouldings, belonging to the capital, pass between the door and sash; thinking that separation not too great for this order, as all its parts are so very large and bold. It would, however, be proper, in frontispieces of the Ionic, and Corinthian orders, to reduce the distance, between the door and window, to two and a half, or three inches, on account of the parts of those orders being much more delicate than those of the Tuscan. The division between the door and sash, in this example, is ornamented by a tablet. Its projection must be exactly equal to that of the capital, or impost moulding, on which it is placed.

Fig. A shews the plan of this frontispiece. It projects from the building two feet four inches; and may be increased to three feet four inches, if necessary. The ceiling, under the raking cornice, may be embellished with panels, &c.

Fig. A.


b
a
1 2 3 4 5 6 7 8 9 10 feet

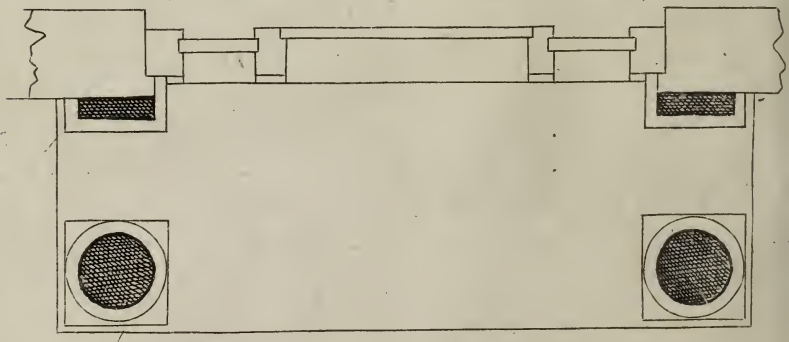


PLATE XXVII.

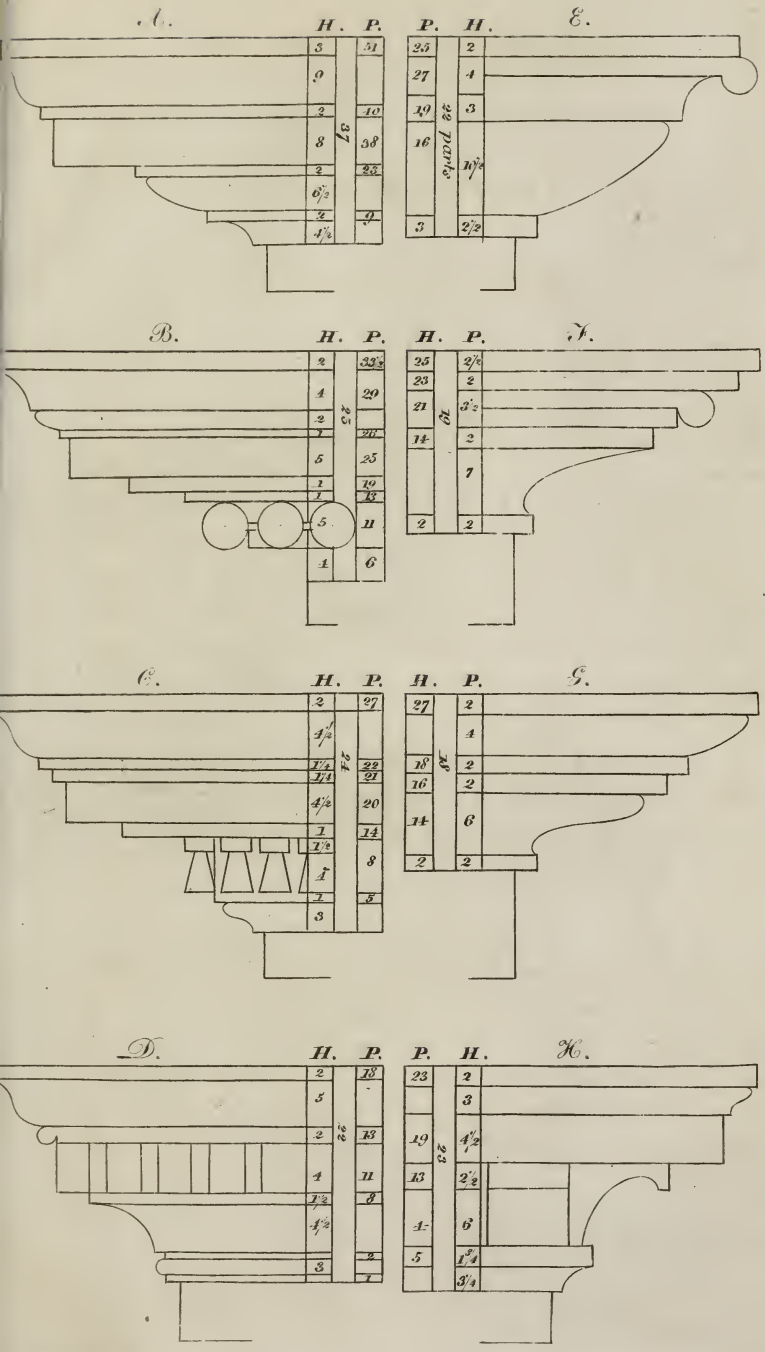
DESIGN FOR A VENETIAN ENTRANCE, EMBELLISHED WITH A DORIC PORTICO.

Divide from *a* to *b* into nine equal parts, one of which will be equal to the diameter of the column; proceed to draw it, as before directed, in the Doric order. Make the subplinth equal in height to the thickness of two steps. The projection from the building and distance, between the columns, must be regulated by the triglyphs in the frieze; see Doric order for explanation. All the other parts of this plate are sufficiently plain, without any further explanation, as each part of it can be accurately measured, by the scale of feet here laid down.

PLATE XXVIII.

DESIGNS FOR CORNICES.

Figs. A B C D and H are proper for the outside finishing ; for eves of buildings, door and window caps, or any other place required. A is drawn from the same scale of minutes, that the Tuscan cornice is drawn from ; and may with propriety, be used instead of that cornice, in small porticos, or in any other place where lightness is required. Figs. E F and G are proper for the finishing of rooms, or any other place required. They have frequently been executed under my direction in stucco, with great success. To proportion them to rooms : suppose a room ten feet high ; divide it into forty equal parts, give one of them to the height of the cornice, which will be three inches ; divide three inches into as many parts as are contained in the height of the cornice, intended to be used ; then each member of the cornice will be so many of those parts, either in height or projection, as are figured on the plate. To proportion cornices to the eves of buildings : suppose a house thirty-five feet high ; divide that height into thirty equal parts, one of which will be the height of the cornice ; then proceed to draw it as above directed. It is, however, often necessary to vary that proportion, if it be required to make a cornice to a house of twenty, or twenty-five feet front, and forty feet


A.
H. P.
5 51
9
2 10
8 38
2 25
6½
2 9
4½
37
E.
P. H.
25 2
27 4
19 3
16
32 Parts.
30½
3 2½
B.
H. P.
2 33½
1 29
2
1 26
5 25
1 19
1 13
5 11
1 6
25
F.
H. P.
25 2½
23 2
21 3½
14 2
7
2 2
21
C.
H. P.
2 27
4½
1¼ 22
1¼ 21
4½ 20
1 14
1½
1 8
1 5
3
24
G.
H. P.
27 2
4
18 2
16 2
14 6
2 2
20
D.
H. P.
2 18
3
2 13
4 11
1½ 8
4½
3 2
1
22
H.
P. H.
23 2
3
19 4½
13 2½
4 6
5 1¼
3/4
23

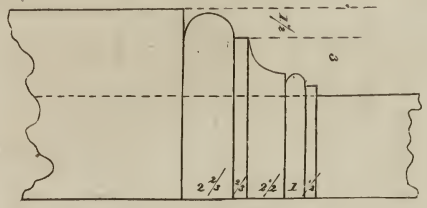
high, unconnected with any other building. In that case, I should not make the cornice larger than one fortieth part of the height ; but for a two story house of twenty-five feet high, and from forty-five to sixty feet front, I should make the cornice about one twenty-sixth part of the height.

PLATE XXIX.

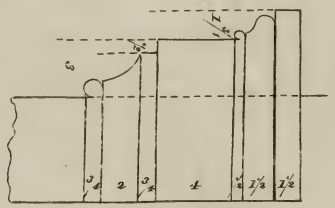
DESIGNS FOR ARCHITRAVES, BASE AND SURBASE MOULDINGS.

To proportion base and surbase mouldings to the pedestal part of rooms : divide from the floor to the top of the surbase into ten parts, one of which will be the height of the surbase. Suppose the height to be two feet, eight inches ; one tenth would be three inches and one fifth of an inch ; divide that distance into as many parts as are contained in the surbase intended to be used ; then each member of the surbase, and also the base, will be so many parts of that scale, either in height or projection, as are figured on the plate. Make the plinth from five to seven inches high.

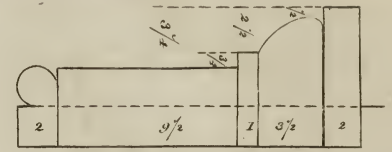
To proportion architraves to doors and windows ; divide the door into eight parts, give one to the width of the architrave ; suppose a door three feet six inches wide ; one eighth would be five and one fourth inches. Divide that distance into as many parts, as are contained in the architrave intended to be used ; then each member of it will be as many parts, either in height or projection as are figured on the plate. It is often necessary to vary that proportion, and oftener for inside of windows, than for doors. For example : A room which required the doors to be three feet, six inches wide, would probably require the window of such a size, that the opening be-



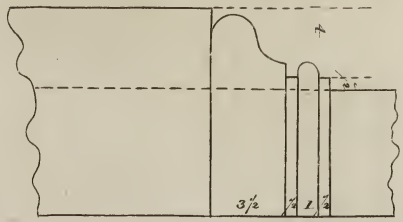
7 1/3



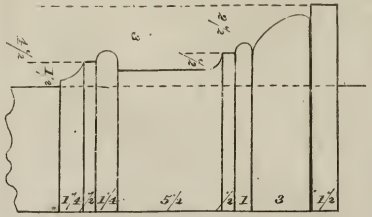
11



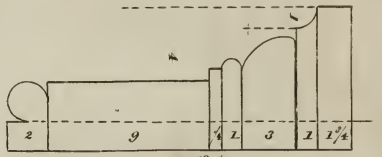
18 parts



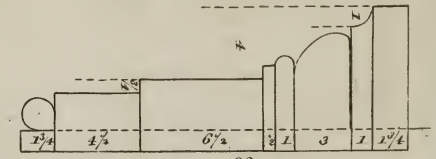
5 1/2



14 1/2



18 1/4



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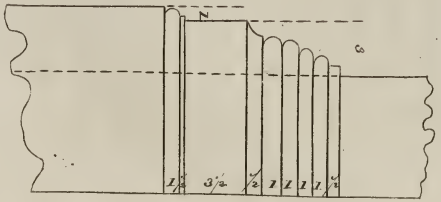
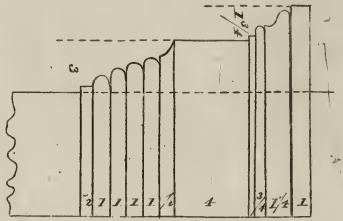
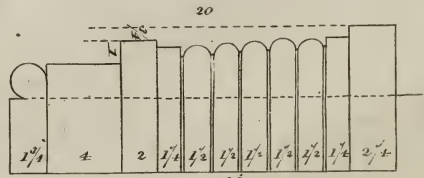


10



12

20



26

tween the architraves would be four feet, four inches, one eighth of which would be six and a half inches. In all such cases I should make the architrave to the windows the same width as that of the doors. It would be very improper to have two widths of architraves in the same room. Judgment must be exercised respecting their proportion. If they are to be used on external parts of buildings, and at a considerable distance from the eye, it will be proper to make them larger, than if used on internal finishings, and near to the eye.

PLATE XXX.

TO DRAW THE SCROLL OF A HAND-RAIL.

Fig. 1. Make a circle three and a half inches in diameter; divide it into three equal parts; make a square in its centre equal to one of those parts; divide each side of that square into six equal parts; draw lines across it both ways, with the distance from 1 in the square to *i*; and on 1 draw from *i* to *k*; on 2 draw *k* 1; on 3 draw 1 *m*; on 4 draw *m n*; on 5 draw *n o*; and on 6 draw *o* 6, which completes the outside revolution. Set the thickness of the rail from 6 to *r*, then on the centres 6 and 5 go the reverse way to complete the inside line. The curtail step is drawn from the same centres as that of the rail, and is represented by the dotted lines on the plate.

TO DRAW THE FACE MOULD FOR SQUARING THE TWIST PART OF THE RAIL.

Make the joint so as to just clear the side of the scroll, as the base line of the pitchboard *a b*; draw ordinates across the scroll at discretion, to cut the line *c b* the longest side of the pitchboard; take notice that lines be drawn from 3 and *b*, so that the points may be exact at 3 and *b*; make 1 *b* in Fig. 2, exactly equal in its length and divisions to 6 *b* in Fig. 1; then transfer the distances 5 10,

Fig. 1.

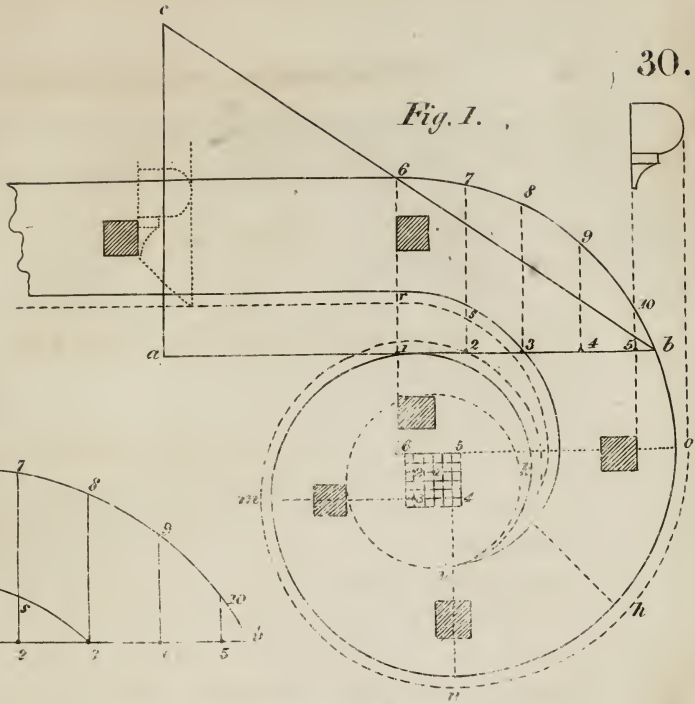


Fig. 2.

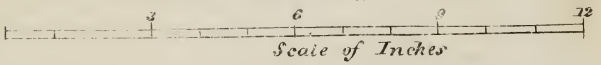


Fig. 3.

Fig. 4.

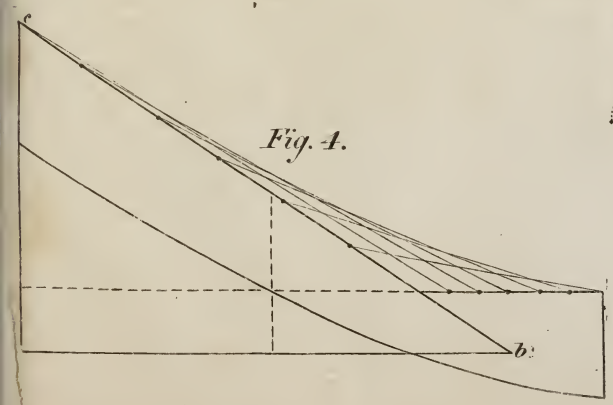
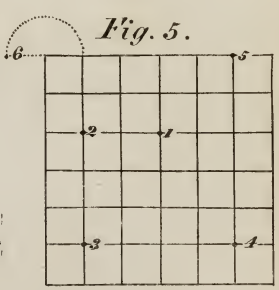


Fig. 5.



4 9, 3 8, 2 *s* 7, and 1 *r* 6 to Fig. 2, and trace the lines as those figures direct, which completes the face mould.

TO DRAW THE FALLING MOULD.

Fig. 3. *a b c* is the pitchboard : its height is divided into six equal parts to give the level of the scroll ; the distance *a d* is from the face of the riser, to the beginning of the twist ; and the distance from *d* to *k* is the stretchout from 6, the beginning of the twist round to *h* in Fig. 1, each, being any point taken at discretion more than the first quarter. Divide the level of the scroll, and the rake of the pitchboard, each, into a like number of parts, and complete the top edge of the mould by intersecting lines, and make the under edge parallel to it.

Fig. 5 represents the eye of the scroll at large, with the centres figured, and lays exactly in the same position as that in Fig. 1.

HOW TO FIND THE PARALLEL THICKNESS OF STUFF FOR THE TWIST AND SCROLL.

Take the stretchout of the line from 6 to *b*, in Fig. 1 ; place it upon the base line of the pitchboard from *d* to *g*, in Fig. 3 ; draw *g h* perpendicular, to intersect the top of the mould, and draw the dotted line *f h* to *i* parallel to the level of the scroll ; then take the distance 1 *b* in Fig. 1, which is the length of the plan for the twist part, and set it from *d* to *e* in Fig. 3 ; and draw *e f* perpendicular to cut the parallel *f h i* ; then draw a dotted line through *f*, parallel to *c b*, the longest side of the pitchboard,

which gives the thickness of stuff for the twist, which is about 4 inches; and from the end of the parallel line *f h i*, and from *i* to *n*, the base line of the scroll, also gives the thickness of stuff for the scroll, which is three inches.

Fig. 4 represents the outside falling mould, and is found in the same manner as that of Fig. 3.

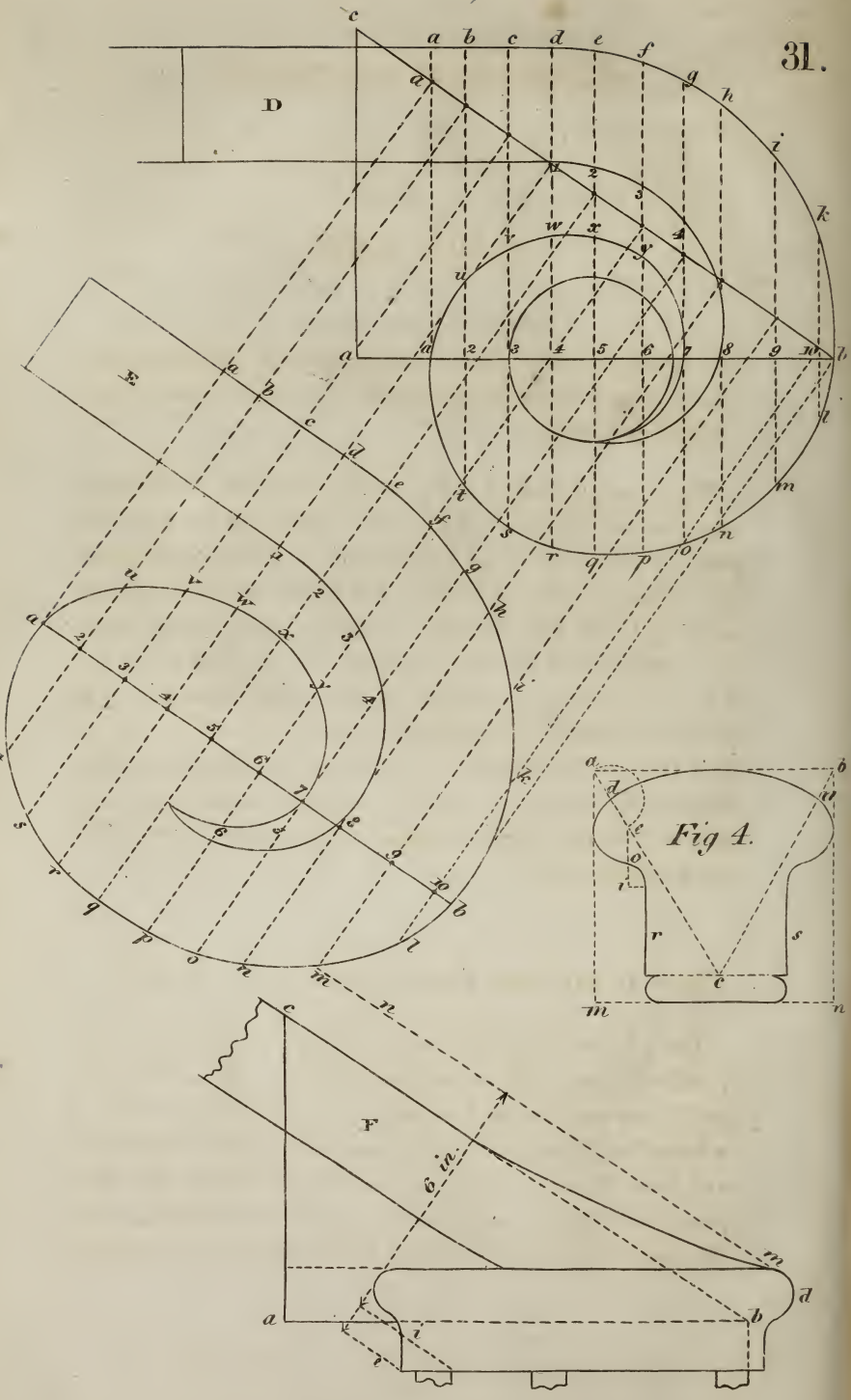


Fig 4.

PLATE XXXI.

THE METHOD OF GETTING A SCROLL OUT OF A SOLID PIECE OF WOOD, THE GRAIN RUNNING THE SAME DIRECTION WITH THE RAIL.

Place the pitchboard *a b c* in Fig. D; then draw ordinates across the scroll at discretion, and make *a b* in E parallel with, and equal in length to *a b* on the longest side of the pitchboard in D; and from where the ordinates of D cut that line, and at right angles with it, draw other ordinates through E, cutting *a b* in E at *a* 2 3 4 5 6 7 8 9 10 and *b*; and on 10 in D take the distances 10 *k*, and 10 *l*; transfer them from 10 to *k* and *l* on E; then on 9 in D take the distances *i* and *m*, and, as before, transfer them to E, and so on; until E, the face mould, is completed. NOTE. The scroll D is drawn as is directed in the foregoing plate.

HOW TO FIND THE PARALLEL THICKNESS OF STUFF.

Let *a b c* be the pitchboard in F, and let the level of the scroll rise one sixth, as in the last plate; then from the end of the pitchboard *b*, which is exactly over the face of a banister, draw the form of a rail, which will extend to *d*; and from the nose of the scroll draw the dotted line *m n* parallel with *c b*; and the distance between that line and the under tip of the scroll will be the thickness required,

which is about six inches. It will be hardly discernible, if a small piece be glued on the under tip of the scroll, from *e* to *i* ; nor will it injure its strength, but would reduce the thickness of stuff to about five and one fourth inches.

Fig. 4 represents a section of a handrail; to draw it, make a square, as *a b n m*, with the distance *a b* ; and on *c* draw the arch *d u* ; and with the distance *d a* on *e* draw *d o* ; make *r s* three fifths of *m n*, and on *i* complete the curve from *o* to the side of the rail *r*.

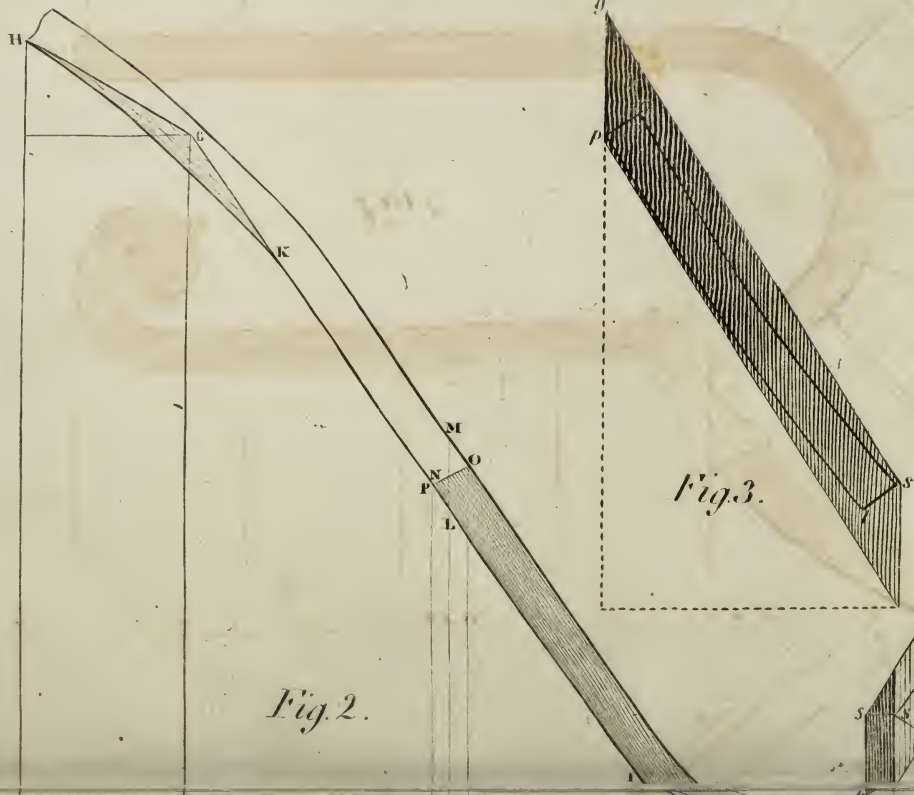


Fig. 2.

Fig. 3.

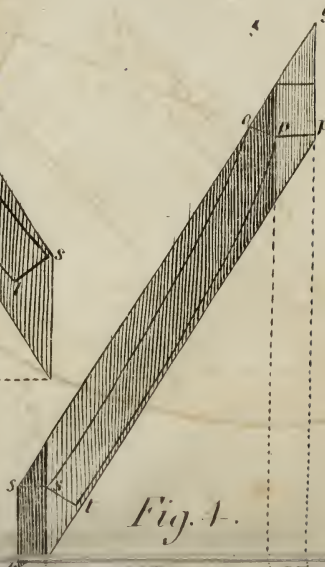


Fig. 4.

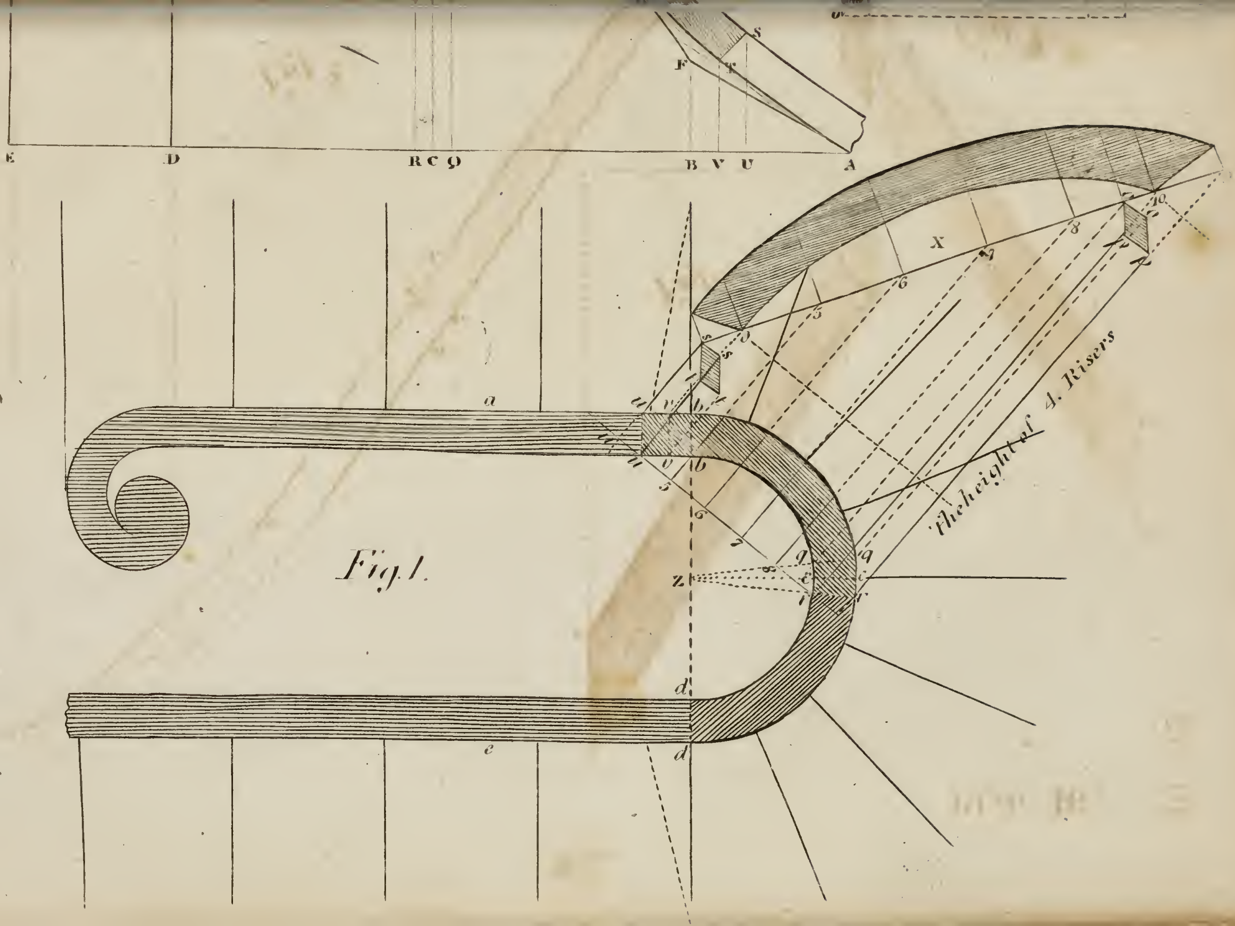


Fig. 1.

PLATE XXXII.

TO FIND MOULDS FOR MAKING BUTT JOINTS FOR A RAIL, WHEN GOT OUT OF THE SOLID.

Let fig. 1 be the plan of a rail; *b c d*, and *b c d*, the two sides of the circular part; *a b* and *d e*, the breadths of two common steps, at the beginning and end of the winders; make the whole stretchout of the straight line, A B C D E, fig. 2, equal to *a b c d e*, round the outside, going upward, fig. 1; that is, make A B, in fig. 2, equal to *a b*, fig. 1; the last common step in the ascent before the winders; B C D, in fig. 2, equal to the circumference of the semicircular part, *b c d*, fig. 1, and D E, in fig 2, equal to *d e*; on the outside, fig. 1, the first common step immediately after ascending the winders, draw the lines B F, D G, and E H, perpendicular to A E; make B F, equal to the height of one step; make D G, one step higher than the number of winders that is in the example; suppose the circular part to contain eight winders, then D G will be equal to the height of nine steps; make E H equal to the height of ten steps; then join A F, F G, and G H, and describe the parabolical parts A I, and K H, and the under edge of the falling mould will be completed; the upper edge will be formed by drawing a line parallel to it, and equal to the thickness of the rail. Bisect the stretchout of the circular part B D, at C; from C, draw C M.

perpendicular to A E, cutting both edges of the falling mould at L and M ; bisect L M at N, and through N, draw O P ; at right angles to the falling mould ; cutting it at O and P ; through the points, O and P, draw O Q, and P R, each perpendicular to A E, cutting A E, at Q and R ; let S T be the joint on the straight part ; then from the points S and T, draw S U and T V, perpendicular to A E, cutting it at U and V, then take the distances C R and C Q, in fig. 2, and apply them in the middle of the circular part, fig 1, from *c* to *r*, and from *c* to *q*, and draw to the centre *r* Z, and *q* Z, cutting the inside of the rail at *r* and *q* ; also take the distances B V, and B U, fig. 2, and apply them from *b* to *v*, and from *b* to *u*, fig. 1 ; then draw *v v* and *u u* at right angles to the rail, cutting the other side at *v* and *u* ; then through the points *u* and *r*, on the inside of the rail, fig. 1, draw the chord *u r*, then from all the points, *u*, *u*, *v*, *v q q*, and *r*, *r*, draw lines *u u s*, *u s*, *v t*, *v t*, and *q o*, &c. each perpendicular to the chord line *u r* ; then complete the sections of the rail *t t s s*, and *o o p p*, as are shown at the shadowed parts, and draw the chord line, *s o*, to touch these sections without cutting them ; then take any number of intermediate points as 5, 6, 7, 8, in the chord *u r*, and draw the lines, 5 5, 6 6, 7 7, 8 8, perpendicular to *u r*, cutting the chord of the face mould, *s o* at the points 5, 6, 7, 8 ; continue the lines *u s* and *r p*, till they cut the chord line of the face mould, *s o*, at *o* and 9 ; through all those points, *s*, *o*, 5, 6, 7, 8, 0, 10, 9, draw lines perpendicular to the chord of the face mould, *s o*, for ordinates, points being found in each of them corresponding to

these ; on the plan and lines being traced through these points the face mould X, will be completed in the usual manner.

N.B. The small letters on the sections of the face mould, and similar capital letters on the falling mould, show corresponding places in each.

HOW TO CUT THE JOINTS.

The stuff must first be cut out by the face mould, and the joints made exactly plumb, according to the face mould, as is shown by figs. 3 and 4.

To make this appear plain, figs. 3 and 4, are different views of this solid rail, got out by the face mould X. Fig. 3 shows the top and convex side of the pieces, which is to make the rail ; take the distance 9 *p*, from the chord line of the face mould, down the perpendicular, fig. 1, and set it from 9 to *p*, in fig. 3 ; then apply the shadowed part of the falling mould at fig. 2, which is to correspond to the block of the rail, fig. 3 ; that is, apply the point S, the upper edge of the lower end of the falling mould, at fig. 2, to the point *s* at the fig. 3, and bend the falling mould round until the point P, the lower edge of the upper end of the falling mould, coincide with the point *p* ; draw a line all round by the falling mould ; it will show how to cut off the ends of the rail, and will also give the upper and lower edge of the rail. Fig. 4, shows the concave side of the piece, in order to show the ends, having similar letters of reference as before. From *s* in fig. 4, draw *s s*, at right angles to *s b* ; then cut off the end through the line *s s*, as

is shown at fig. 3, and through the points *s*, *t*, as is shown at fig. 4. The upper joint will be found in the same manner; that is, by drawing the line *p p*, at right angles to 9 *p*; then cut off the end, through the line *p p*, in fig. 4, and through *p o*, as is shown in the other view, fig. 3. If great accuracy is required in squaring the rail, make an inside falling mould, which apply the under edge of the upper end to the point *p*, in fig 4, and the upper edge of the lower end of the falling mould, to the point *s*, and draw lines above and below, by the two edges of the falling mould; and it will give the form of the upper and under edges of the rail. By this method of proceeding, the workmen will be enabled to cut out the stuff of a hand rail with very great accuracy.

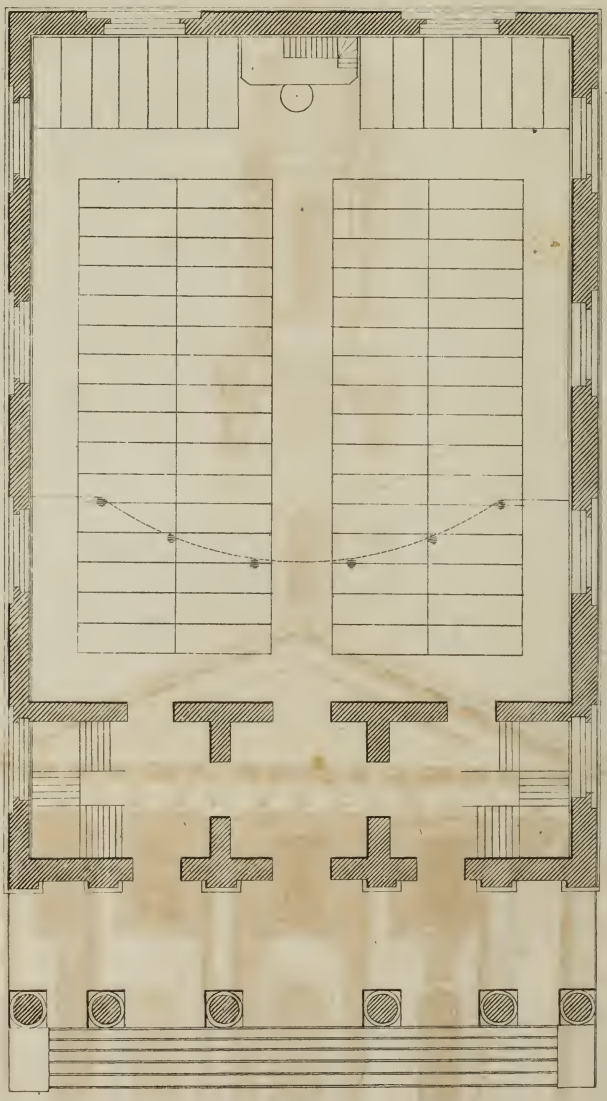


Fig. A

Plate A.

Fig. B

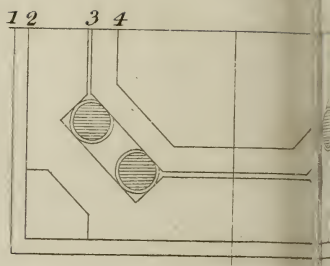
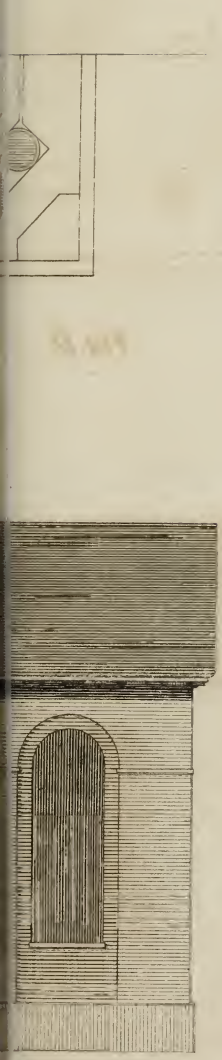


Fig. D.

Fig. C.

Plate B.



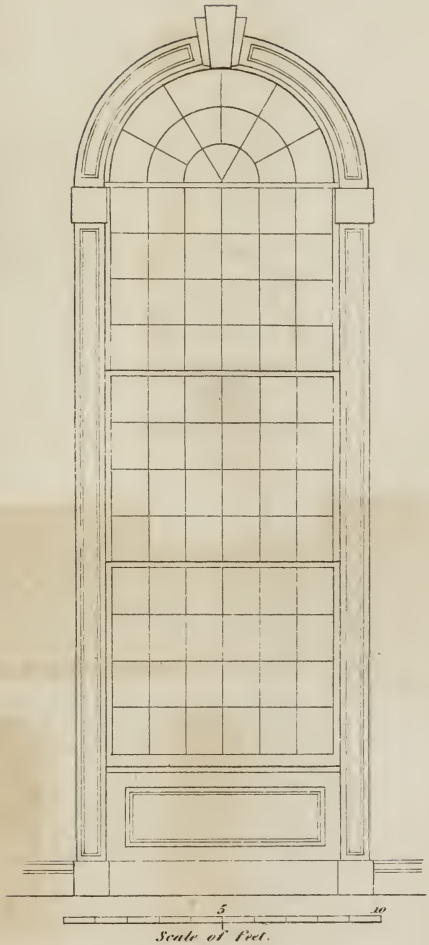


Fig. E.

PLATES A & B.

PLAN AND ELEVATIONS OF A CHURCH.

Plate A, fig. *a*, is a plan ; fig. *b*, an elevation of a Church, drawn on a scale of twenty feet to an inch, which will contain about one thousand people. The dotted line on the plan represents the front line of the gallery, which is intended to run across the front only, and not continue along the sides of the house, as is common in churches in this country.

Plate B, fig. *c*, is a side elevation for the same building. Fig. *d* respresents a plan of the cupola ; 1, shews the shape and size of the tower, as it rises from the roof of the house ; 2, the shape and size of the story which is intendtended to contain the bell and clock ; 3, the shape and size of the octagon story, which is to be finished after the Ionic order ; and 4, the size and shape of the base which is to support the roof. *e* shows the size and shape of the glass, and the manner of finishing the inside of one of the windows, any part of which may be measured by the scale of feet below it.

A TABLE,

Shewing the weight of square bars of iron of one foot in length, from three eighths of an inch to four inches square; also flat bars of the same length, from three eighths in thickness by one and a half inches wide, to three fourths in thickness by three and three fourths inches wide; which will be found very useful for estimating the prices of iron work, such as fences, gates, window guardirons, &c.

WEIGHT OF SQUARE IRON BARS.

Square.		lb.	qr.	oz.
	3/8	0	3/4	0
	1/2	1	1/4	2
	5/8	1	3/4	1
	3/4	2	1	3
In.	7/8	2	1/2	0
1	0	3	1/2	3
1	1/8	4	1/2	0
1	1/4	5	1/2	3 1/2
1	3/8	6	1/2	2
1	1/2	7	3/4	2
1	5/8	9	1/4	0
1	3/4	10	1/2	3 1/2
1	7/8	12	1/4	1
2	0	14	0	0
2	1/8	15	3/4	1
2	1/4	17	1/2	3
2	3/8	19	3/4	0
2	1/2	21	3/4	2
2	5/8	24	2	0
2	3/4	26	1/4	3
2	7/8	28	3/4	3
3	0	31	1/2	0
3	1/4	37	0	0
3	1/2	42	3/4	0
3	3/4	49	3/4	0
4	0	56	0	0

WEIGHT OF FLAT IRON BARS.

Width in Inches		Thickness.	lb.	qr.	oz.
1	1/2	3/8	1	3/4	3 1/2
1	3/4	3/8	2	1/4	0
1	1/2	1/2	2	0	2
1	5/8	1/2	2	3/4	1 1/2
1	3/4	1/2	3	0	1
1	7/8	1/2	3	1/4	0 1/2
2	0	1/2	3	1/2	0
2	1/4	1/2	3	3/4	0
2	3/8	1/2	4	0	2 1/2
2	1/2	1/2	4	1/2	2
2	3/4	1/2	4	3/4	1
2	3/4	5/8	5	1/4	2 1/2
3	0	1/2	5	1/4	0
3	0	5/8	6	1/2	1
3	0	3/4	8	0	1 1/2
3	1/4	1/2	5	1/2	3
3	1/4	5/8	7	0	1 3/4
3	1/4	3/4	8	1/2	0 1/2
3	1/2	1/2	6	0	2
3	1/2	5/8	7	1/2	2
3	5/8	3/4	9	1/2	1 1/2
3	3/4	3/4	9	3/4	1 1/2

CONTENTS OF THE PLATES.